

Mining

CONGRESS JOURNAL



★
MARCH
1949





Both
**need the
right union
for best
results**

No removable rock bit can be better than its union, whether it's deep-hardened steel or carbide insert. Even Timken bits would not yield the outstanding performance that is built into them without the Timken union with one-piece, solid steel shoulder construction; neither would they last as long.

The Timken union saves the bit and steel threads by taking the drill impact on the broad, flat machined shoulder of the steel. It increases drilling speed by distributing the hammer blows evenly over the cutting edges of the bit; this also enables the bit to retain its gauge to the limit of its useful life.

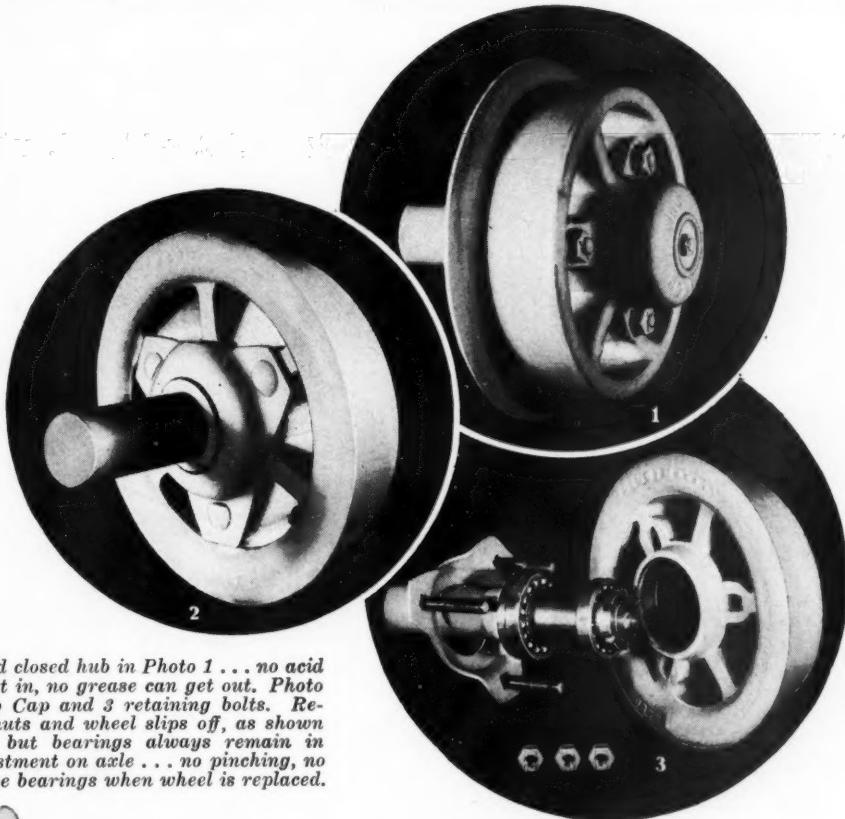
The Timken union is a single solid piece of steel—nothing to loosen up under the shock of the hammer blows no matter how hard the rock may be.

The Timken bit and the Timken union are made for each other. There is no other way to obtain Timken rock bit performance.

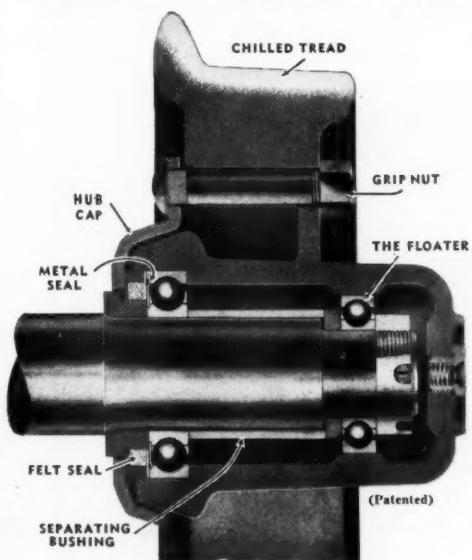
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

TNF TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO — CABLE ADDRESS "TIMROS60"

... you get 4-WAY SAVINGS with the remarkable S-D "FLOATER" . . .



Note the solid closed hub in Photo 1 . . . no acid water can get in, no grease can get out. Photo 2 shows Hub Cap and 3 retaining bolts. Remove the 3 nuts and wheel slips off, as shown in Photo 3, but bearings always remain in perfect adjustment on axle . . . no pinching, no tight, no loose bearings when wheel is replaced.



In four big ways, S-D "Floater" Demountable Ball Bearing Wheels save you money.

First, in Lubrication costs. How often do you grease your present wheels? Figure it up and then balance the cost against our guarantee that you should not grease our "Floaters" more than once in 5 years. If you do, we pay the extra cost.

Second, Power Savings. Tests made by independent engineering firms have proved that smooth-running "Floaters" can increase the net loads hauled by locomotives as much as 50% over other types of precision bearings . . . a tremendous power saver.

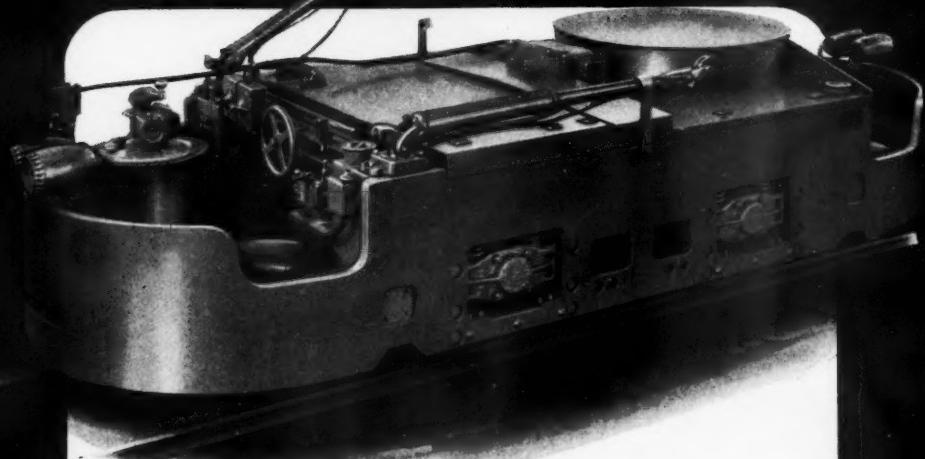
Third, Maintenance Time. If at any time it is necessary to remove a wheel, the "Floater" can be demounted as quickly and easily as an automobile wheel. No adjustment of bearings to worry with . . . a big time saver.

Fourth, we guarantee "Floater" wheels against breakage or undue wear, as well as bearings against bearing failures for 5 years . . . your assurance of perfect satisfaction.

20 Car loads of "Automatics" from -

SANFORD-DAY IRON WORKS, Inc. • Knoxville, Tenn.

*Engineered Transportation
with*



JEFFREY LOCOMOTIVES

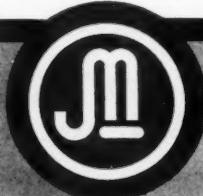
Gathering and Haulage Types

The widely diversified conditions prevailing throughout coal properties requires transportation equipment that is designed to meet the specific needs of that property.

For more than 65 years Jeffrey has been designing, developing and building locomotives for coal mine service. With this wealth of experience and a corps of specially trained engineers Jeffrey is in a position to help you with your transportation system.

There are three types—trolley, cable reel and storage battery—to cover all phases of service either gathering or main haulage . . . and under all operating conditions.

One of the new streamlined locomotives is shown above. It is an 8-ton explosion tested job.





THE JEFFREY MANUFACTURING COMPANY

958 North Fourth Street, Columbus 16, Ohio

Sales Offices:

Baltimore
Birmingham
Boston
Buffalo

Chicago
Cleveland
Cincinnati
Detroit

Denver
Harlan
Houston
Huntington

Jacksonville
Milwaukee
New York
Philadelphia

Pittsburgh
Scranton
St. Louis
Salt Lake City

Service Stations:

Pittsburgh
Harlan, Ky.

Birmingham
Mt. Vernon, Ill.

Logan-Beckley
W. Va.

Scranton

Foreign Plants:

Jeffrey Mfg. Co., Ltd.
Montreal, Quebec

British Jeffrey-Diamond Ltd.
Wakefield, England

Jeffrey-Galion (Pty), Ltd.
Johannesburg, S. A.



JOIN THE TREND TO TOP

PERFORMANCE



Preformed "Blue Center" Wire Rope

A FIRST SPECIFICATION AMONG MINING MEN

WHEN YOU PULL DOWN COSTS these days it's something to brag about. And with Preformed "Blue Center" Wire Rope you can cut costs to the minimum.

"Blue Center" Steel—made only by Roebling—provides shock resisting

stamina and toughness. The Preforming process—improved and perfected—simplifies installation, reduces whipping and vibration, improves winding. It is not inclined to twist and kink . . . is easy to handle and install . . . can be cut without seizing. This combination of

advantages gives unsurpassed life and serviceability.

Roebling Wire Rope is one of the best-known products in industry today. There's a type and size for every kind of service. Have your Roebling Field Man suggest the *one* rope best adapted to your requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

— WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST
ROEBLING OFFICE AND WAREHOUSE —

Atlanta, 934 Avon Ave. ★ Boston, 51 Sleeper St. ★ Chicago, 5525 W. Roosevelt Rd. ★ Cleveland, 701 St. Clair Ave., N. E. ★ Denver, 1635 17th St. ★ Houston, 6216 Navigation Blvd. ★ Los Angeles, 216 S. Alameda St. ★ New York, 19 Rector St. ★ Philadelphia, 12 S. 12th St. ★ Pittsburgh, 855 W. North Ave. ★ Portland, Ore., 1032 N. W. 14th Ave. ★ San Francisco, 1740 17th St. ★ Seattle, 900 First Ave.

ROEBLING

★ A CENTURY OF CONFIDENCE ★

JULIAN D. CONOVER
Editorial Director

SHELDON P. WIMPFEN
Editor

Associate Editors
A. W. DICKINSON
G. B. SOUTHWARD
H. L. MOFFETT

Production
B. C. WILKERSON



Advertising
P. D. McMURRER, Mgr.

FRANK W. MORAN
(Chicago)

RALPH F. DUYSTERS
(New York City)

RALPH W. HARKER
*(Los Angeles and
San Francisco)*

Contents

VOLUME 35, NUMBER 3

FOR MARCH, 1949

FRONT COVER—Drilling a Round in a Cut and Fill Stopes at the
New Park Mining Co.

	PAGE
EDITORIAL	25
HEAVY EQUIPMENT MINES FLORIDA PHOSPHATE..... By IRVING S. TILLOTSON	26
STRUCTURE OF MINE ROOF..... By CHARLES T. HOLLAND	29
HOW THE GREATER BUTTE PROJECT WAS BORN..... By CHESTER H. STEELE	32
CLEANING AND DEWATERING FINE COAL..... By GEORGE T. BATOR	37
SAFETY—FIRST! LAST! ALWAYS!.....	42
COAL SHOW PLANS COMPLETED.....	45
AUTOMATIC PUMP SUPPLIES SPRAY WATER.....	49
REDUCING SHAFT SINKING COSTS..... By CLARK L. WILSON	50
SURFACE FACTORS AFFECTING PILLAR RECOVERY..... By H. P. GREENWALD	54
WHEELS OF GOVERNMENT.....	58
PERSONALS	61
NEWS AND VIEWS.....	63
MANUFACTURERS FORUM	74

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

Indexed regularly by Engineering Index, Inc.

Copyright 1949, by

THE AMERICAN MINING CONGRESS

1102 RING BLDG., WASHINGTON 6, D. C.

HOWARD I. YOUNG DONALD A. CALLAHAN ANDREW FLETCHER JAMES D. FRANCIS JULIAN D. CONOVER
President Vice President Vice President Vice President Secretary

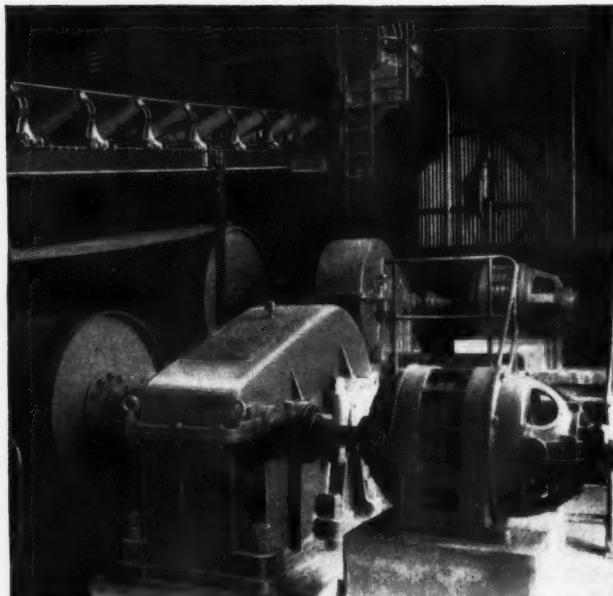
Published Monthly. Yearly subscriptions, United States, Canada, Central
and South America, \$3.00. Foreign, \$5.00. Single copies, \$0.30. Febru-
ary Annual Review Issue, \$1.00. Entered as Second-class Matter, January
30, 1915, at the Post Office at Washington, D. C.



Member Audit Bureau of Circulations.



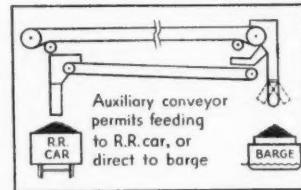
Why Link-Belt leads in belt conveyor engineering



Terminal belt conveyor drive equipment at Robena Mine (above). The success of Link-Belt conveyor installations in raising production rates and cutting handling costs is due not only to the most advanced design and construction of Link-Belt manufactured components, such as carrying and return idlers, terminal and drive machinery, welded steel pulleys, and highly efficient speed reducers, but to broad engineering experience in integrating these elements most effectively.

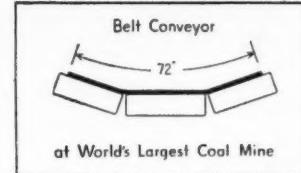
LONGEST

belt conveyor in the mining industry (10,900 ft.) for a metallurgical coal mine in West Virginia.



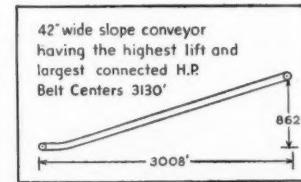
WIDEST

belt conveyor in the mining industry (72" belt), installed at the largest coal mine (Robena Mine of H.C. Frick Coke Company).



HIGHEST

lift (862 ft.) in the mining industry for a Southern Illinois* coal mine.



Tough handling jobs are made easy by Link-Belt, through long and wide engineering experience with integration of standardized equipment.



Above: 1700 ft. long belt conveyor in the mining industry. One of a number of Link-Belt slope belt conveyors installed on the iron range. Below: 72" de belt conveyor delivering coal to shuttle belt conveyor.



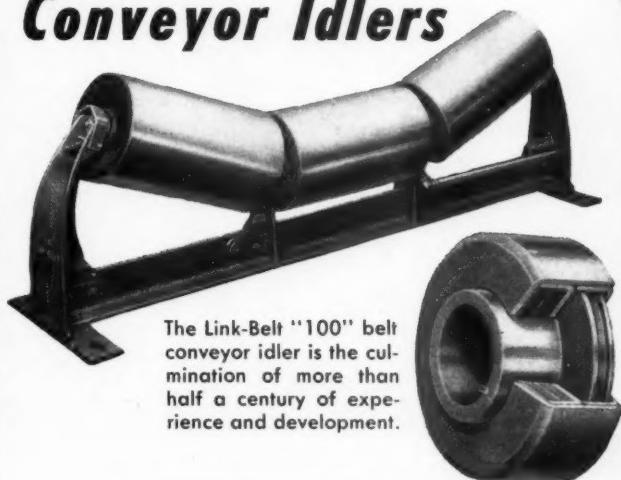
For details of these and other Link-Belt conveyor installations, get in touch with our nearest office.

LINK-BELT COMPANY

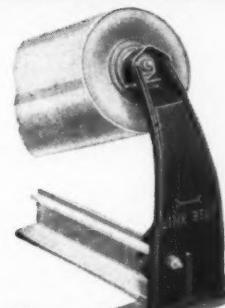
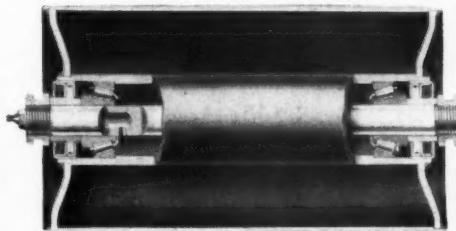
11,413

Baltimore 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntingdon, Pa., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, St. Louis 4, Minneapolis 5, Birmingham 3, St. Louis 1, Los Angeles 33, San Francisco 24, Seattle 4, Toronto 8.

LINK-BELT Belt Conveyor Idlers



The Link-Belt "100" belt conveyor idler is the culmination of more than half a century of experience and development.



Illustrations above and to the left show the positive Grease-In-Dirt-Out Seal which conserves lubricant and prolongs bearing life . . . cross-section of roll, showing shaft, grease seals and roller bearings . . . tough malleable bracket in reinforced T-section to withstand load and impact.



Link-Belt positive action self-aligning troughing idler. For details on Link-Belt belt conveyor equipment, ask for Book 1915.

LINK-BELT
CONVEYORS

HANDLING EQUIPMENT . . . POWER TRANSMISSION MACHINERY



LOWER SURFACE MINING COSTS

with Tried and Tested
Earth-Moving Equipment

More and more miners are recovering coal by surface stripping — the modern, lower cost, safer way. Coal tonnage obtained by strip methods is now over four times higher than in 1936.

In keeping with their modern mining methods . . . many alert, cost-conscious strip-miners are using modern, powerful Allis-Chalmers tractors and motor graders . . . proved, widely used earth-moving equipment.

Modern mining with modern equipment means **BIG TONNAGE** at **LOWEST COST**.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.



BIG VOLUME . . .



SMOOTHING THE WAY



FAST, LOW COST LOADING

Loading coal into trucks with this economical Allis-Chalmers HD-5 tractor and Tracto-Shovel saves money for the Theyer Coal Co., Hackett, Ark. Versatile, all-round, you can also use this outfit for loading any loose material and for excavating and loading dirt. Interchangeable attachments further widen its usefulness — available with bulldozer blade, snowplow, snow loader bucket, various sizes of material handling buckets and bucket teeth.



Fleets of Allis-Chalmers Model HD-19 Hydraulic Torque Converter Tractors team-up with large capacity, 24 cu. yd. Gar Wood scrapers to strip huge volumes of yardage for Badgett

Mine Stripping Corp., Ky. The rugged and tough HD-19 — the WORLD'S LARGEST TRACTOR — outpulls and outperforms any tractor ever built.



Building haul roads and keeping them smooth . . . cleaning coal beds . . . scarifying bony and clearing it from coal beds are some of the jobs of these powerful Allis-Chalmers Model AD Motor Graders for Manville Collieries Co. near Terre Haute, Ind. and G. H. Yoxtheimer, Northumberland, Pa. Another Allis-Chalmers



Motor Grader — the low cost W-Speed Patrol — is a popular outfit with miners for sweeping coal . . . besides being an especially economical machine for maintaining haul roads — shown cleaning a coal bed at the Apex mine for Harmon Creek Coal Co., Hopedale, Ohio.



TEAM WORK Assisting big strippers, thereby keeping down stripping cost, are the main jobs of these fast-working, smooth-operating HD-19's for Maumee Collieries Co. at Jasonville, Ind., and Northern Illinois Coal Co., Coal City, Ill.



They clean up around the strippers and push material within reach . . . also level roadbeds for strippers . . . clean roadways for blast hole drills . . . build roads, strip hillside seams, level spoil banks and pull heavy equipment, among other jobs.

MODERN MINING WITH MODERN EQUIPMENT MEANS BIG TONNAGE AT LOWEST COST!



These caps promote safety in Electrical Firing

Designed to meet any underground condition, these dependable Du Pont Electric Blasting Caps are raising blasting efficiency in all types of ore mining.

DU PONT INSTANTANEOUS ELECTRIC BLASTING CAPS offer three exclusive safety features:

1. **Nylon Insulated Wires**—Abrasion-resistant, non-cracking, brilliantly colored for quick identification.
2. **Rubber Plug Closure**—Double crimped into shells, highly water-resistant.
3. **Aluminum Foil Shielded Shunt**—Bared ends short-circuited for entire length and shielded from accidental contact with electric currents.

DU PONT "SERIES B" DELAY ELECTRIC BLASTING CAPS, in addition to the above advantages, also

1. **Increase the safety** of rotational shooting by eliminating misfires due to arcing or "water hammer."
2. **Function perfectly** in all ten periods under the most adverse conditions—

high voltages, parallel circuits and under water.

DU PONT "MS" (millisecond) DELAY ELECTRIC BLASTING CAPS combine the three safety features of the instantaneous caps with these outstanding advantages over conventional-type delays.

1. **Better fragmentation**—allowing a saving in dynamite.
2. **Reduction in bootlegs**—rounds pulled clean.
3. **Prevention of cutoffs**—dynamite in the muck eliminated.
4. **Less concussion and vibration**—timber damage prevented.
5. **Easier Priming**—all nine periods have the same length shell.

The Du Pont Explosives representative serving your district will gladly give you the complete information about all these dependable blasting caps and products shown in column at the right. Ask him for the story.

E. I. DU PONT DE NEMOURS & CO. (INC.)
Explosives Department, Wilmington 98, Del.

Dependable Dynamites ... Supplies and Accessories

for Efficient Underground
Ore Mining

Du Pont Special Gelatin

High velocity, water-resistant dynamite that is plastic and cohesive. Has excellent fumes.

★ ★ ★

Du Pont "Gelex"**

A semi-gelatinous dynamite that economically meets most requirements. Has exceptionally good water-resistance.

★ ★ ★

DuPont "Extra" Dynamites

In many cases these dynamites give efficient and economical results where soft ores are encountered.

★ ★ ★

Du Pont Superior Crimper

Safely forms a double crimp that makes the cap joint even more water-resistant than the fuse itself.



Du Pont Quick-Seal Tamping Plugs

They provide the easiest and quickest method of stemming charges. Four diameters: 1-1/2, 1-3/4, 2 and 2-1/4 inches.



DU PONT BLASTING GALVANOMETER RHEOSTATS CONNECTING WIRE LEADING WIRE

Listen to "Cavalcade of America"—
Monday evenings—NBC

*Trade-mark Reg. U. S. Pat. Off.



KEN. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY™

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

JUST

THROW THE LEVER

*And watch this
stand-and-signal
combination go into action*

The switch stand is Bethlehem's old reliable 1217, a type that's been sold by the hundreds of thousands. But here, something new has been added—a built-on reflector target that changes automatically, through a 90-degree arc, when the switch points are thrown. It's simple, positive, foolproof.

The signal is equipped with 3-in. red and green Stimsonite reflectors that stand out like cat's eyes when light is beamed on them. The motorman can see them so far away that he can control his trip with unusual safety. The brakeman, too, is aided by these large, brilliant reflectors. They pick up his light and he's able to locate the stand in a jiffy.

The reflector target is an integral part of the Model 1217 stand.* There are no extra connecting rods to

* Bethlehem's Model 1217 Switch Stand can, of course, be furnished without the target—just as in the past. However, when the combination is ordered, specify Bethlehem Model 1217 Switch Stand with Reflector Target, and state whether Design 829 Spring Rod or Design 8-VM Rigid Rod is to be furnished with the stand.

install, no extra holes to drill in switch rods, no tie extension. The positions of the red and green reflectors can easily be reversed; simply remove two bolts and invert the target-blade assembly.

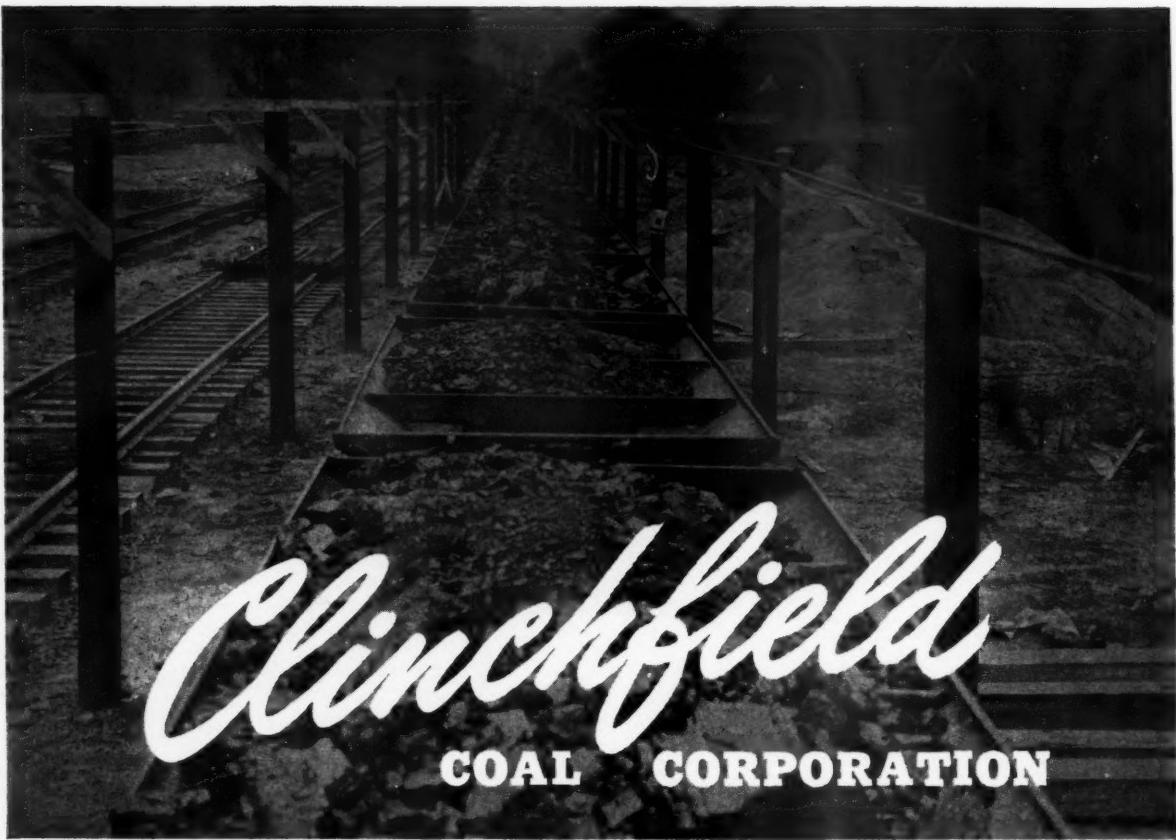
Compact? The top of the target is a bare 12 in. above the ties. And being an integral part of the switch stand, the signal presents no installation problems.

Ask a Bethlehem man to demonstrate. This is something with *real, practical advantages*.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation*





Clinchfield

COAL CORPORATION

...pins its faith to **A.C.F.** DROP BOTTOM MINE CARS
for coal transportation efficiency at the new MOSS and MEADE mines

Opened in June 1947, the Moss Mine located in Dickenson County, Va., is served by the Clinchfield Railroad. Mobile mining units load into large **A.C.F.** Drop Bottom Mine Cars of standard automatic-trip design. Present capacity of this mine is 10,000 tons per day.

The MEADE Mine, located in Wise

County, Va., was opened a year later, in June 1948. This mine is still in active development. Mine is served by the Chesapeake and Ohio Railway. When full scale operation is attained an average daily output of 8000 tons is anticipated. The mining schedule calls for loading by mobile units into **A.C.F.** Drop Bottom Cars.

A.C.F. Mine Cars of this latest Drop Bottom Type will lower your cost by **SAVING DUMPING TIME**. Their use results in (1) more trips per shift, (2) an increase in the efficiency of your loaders, and (3) **INCREASED PRODUCTION**.

Our sales representatives will be glad to discuss the merits of Drop Bottom Mine Cars with you.

AMERICAN CAR AND FOUNDRY COMPANY
NEW YORK • CHICAGO • CLEVELAND • WASHINGTON • ST. LOUIS
PHILADELPHIA • HUNTINGTON, W. VA. • BERWICK, PA. • PITTSBURGH • SAN FRANCISCO

BAKER **BULLDOZERS**

FIRST CHOICE

BY A WIDE MARGIN



A Few Recent Purchasers of One or More Baker Dozers and A-C HD-19 Tractors

O'DELL-RINEY CONST. CO.
Contractor — Hannibal, Mo.

OOLITE ROCK CO.
Quarry — Miami, Fla.

S. A. HEALY CO.
Contractor — White Plains, N. Y.

CONSUMERS POWER CO.
Utility — Jackson, Mich.

MAUMEE COLLIERIES
Coal Mine — Terre Haute, Ind.

SUNLIGHT COAL CO.
Coal Mining — Bonville, Ind.

DAYTON POWER & LIGHT CO.
Utility — Dayton, Ohio

WYANDOTTE CHEMICALS CORP.
Quarry — Alpena, Mich.

LONE STAR CEMENT CO.
Cement — Bonner Springs, Kan.

CHILE EXPLORATION CO.
Mining — New York, N. Y.

SMITH CONTRACTING CORP.
Contractor — Ft. Worth, Texas

ROBINSON CLAY PROD. CO.
Quarry — Akron, Ohio

HYDRO-ELECTRIC POWER COM'N.
Utility — Toronto, Can.

CANADIAN INTERNATIONAL PAPER CO.
Logging — Montreal, Can.

OLIVER IRON MINING CO.
Mining — Duluth, Minn.

The Baker Bulldozer and HD-19 Allis-Chalmers tractor combination has really rocked the industry — amazed even the most experienced earth-movers with its power, traction and speed — with its ability to move more yardage than any unit in its class.

The Baker Hydraulic Bulldozer is perfectly matched in operating speed, balance and weight . . . important factors in getting the most out of the tractor. Its simplicity of design and operation mean faster bulldozing with less operator fatigue plus longer, trouble-free service.

Now, with buying again becoming selective, it is significant that from coast to coast — among contractors, quarries, mines, utilities and loggers — among experienced earth-movers who've tried them all, it's Baker Bulldozers by a wide margin. Before you buy any bulldozer, check with your Baker - Allis-Chalmers dealer.

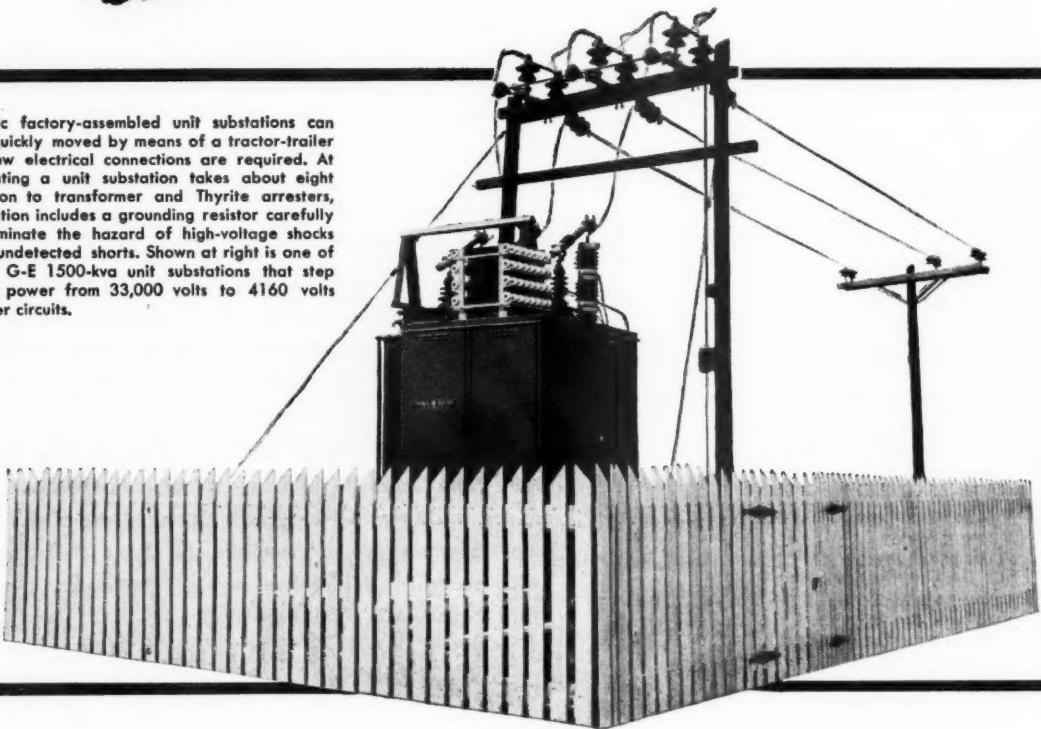
BUY THE BEST . . . BUY BAKER

BAKER

SPRINGFIELD • ILLINOIS

*"the saving
is tremendous!"*

General Electric factory-assembled unit substations can be easily and quickly moved by means of a tractor-trailer unit. Only a few electrical connections are required. At Maumee, relocating a unit substation takes about eight hours. In addition to transformer and Thyrite arresters, each unit substation includes a grounding resistor carefully designed to eliminate the hazard of high-voltage shocks resulting from undetected shorts. Shown at right is one of Maumee's four G-E 1500-kva unit substations that step down incoming power from 33,000 volts to 4160 volts for use in feeder circuits.



GENERAL  ELECTRIC

657-72

"\$6000 A YEAR SAVED IN POWER COSTS . . . RELOCATING COSTS CUT IN HALF!"

That's what Mr. Evans Bennington, Supt. of Electrical Maintenance at Maumee Collieries, says of their co-ordinated G-E power distribution system for strip mining units.

Here's an outstanding example of modern, efficient mine power distribution—the Maumee Collieries Company's strip mining operations at Terre Haute, Indiana. A fully co-ordinated General Electric system, it teams up unit substations, cable, and cable-skid switch houses to cut production delays with better voltage at the pit, provide maximum safety to workmen and equipment, and reduce moving time and costs.

"Use of G-E cable and cable skids," says Mr. Bennington, "has given us a most flexible power-system arrangement for feeding shovels, draglines, loaders and other excavating equipment. The initial cost of a cable distribution system, compared with an overhead line, is approximately

the same. But the cost of moving the cable system is about one-half or less the cost of moving an overhead line system. When you consider that this system has to be changed on an average of at least every six months, the saving is tremendous.

"By buying power at 33,000 volts, we have been able to combine three metering points into one. This has resulted in putting two of the operations in the low kilowatt-hour bracket. In addition, the power company gives us a 10 percent rebate for owning our own substation, which, combined with the kilowatt-hour savings, saves us about \$6000 a year."

You can bring new speed, flexibility and safety—plus new economies—to your surface mining operations with a completely integrated G-E power distribution "package". A G-E engineer with years of experience in mining problems will gladly give you the facts. Call him at your nearest G-E office. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



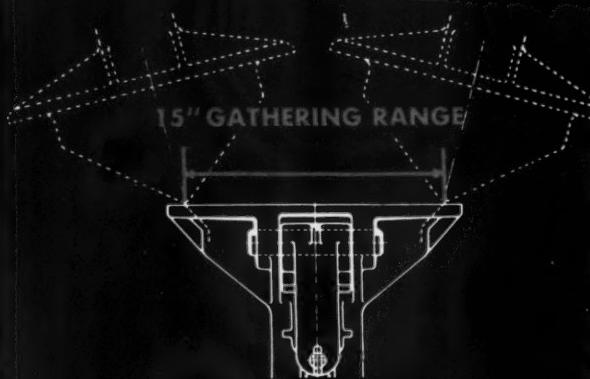
This newest-type General Electric cable-skid switch house, one of twelve in use by Maumee, provides maximum portability and convenience plus more selective tripping. Unit, weighing 1600 lbs., measures 40 in. wide, 48 in. deep, 51 in. high in front and 43 in. high in rear, exclusive of skid. Front has two sockets for incoming trunk-line cable connections (see inset, above). From the three load outlets at the rear, portable cable brings power to strip mining units. Most of Maumee's 35,000 to 40,000 feet of portable cable is G-E Type SH-D, highly resistant to rough handling and excessive flexing.



POWER DISTRIBUTION SYSTEMS

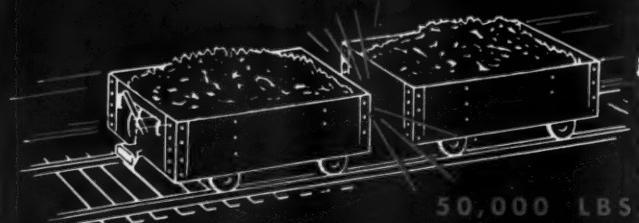
**— to cut mining costs
per ton!**

BUILT FOR



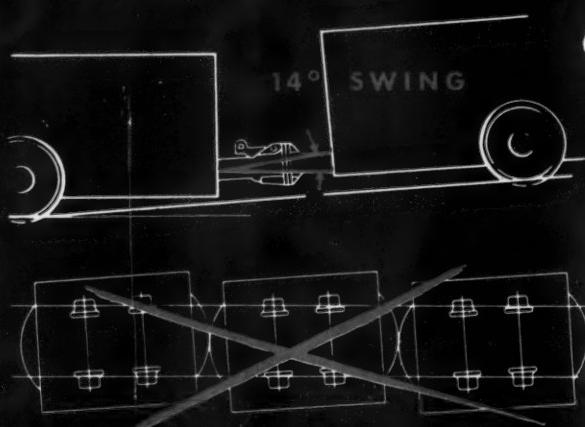
... ON CURVES

Male-and-female type coupler heads provide the O-B Automatic Coupler with 50 percent more gathering range than is found in ordinary couplers. Depending upon the car construction and its relation to the track, O-B Couplers will enable cars to operate over and automatically couple upon curves of minimum radius.



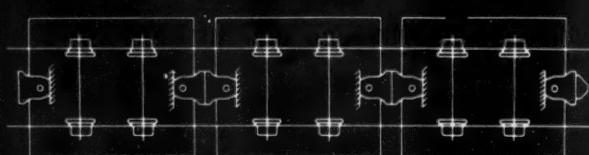
... UNDER HEAVY IMPACT

Tough, springy rubber buffering pads replace breakable steel springs in O-B's modern draft gear assembly. Completely enclosed, the rubber draft gear will absorb impact blows up to 50,000 pounds—as much as 100,000 pounds with the Form-8 design.



... OVER DIPS AND KNUCKLES

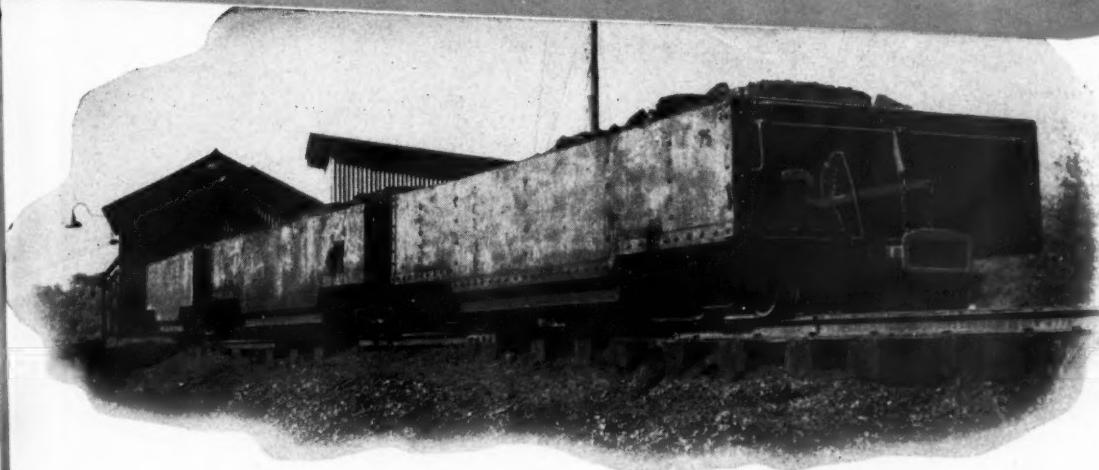
A vertical swing of 14° enables O-B Couplers to operate over sharp breaks in grade. All movement takes place in the flexible rubber draft gear—the coupler faces remain locked to each other in center-to-center position. In addition, five inches of vertical gathering range permit the couplers to join on a wide range of dips and knuckles.



... ON THE TRACK

Preventing zigzagging under push or buff, O-B Form-8 Couplers actually help to keep your cars on the track. An improved draft gear construction holds the cars tightly in center-to-center position counteracting the car's normal tendency to ride the rail under push or buff.

MINE WORK



Take a good look at the O-B Automatic Coupler in the picture above. It appears to be different from railroad-type couplers. It is different—and for good reasons, too! Railroad-type couplers were developed for railroads with their long stretches of straight track and gradual curves and grades. Mining service imposes an entirely different set of conditions. It requires a coupler which is designed specifically to meet those conditions.

Because mine curves have shorter radii and coupling on curves is frequent, O-B Couplers are provided

with extra-wide gathering range. They permit cars to operate over sharp breaks in grade at dips and knuckles. Their sturdy rubber draft gear will absorb severe impact blows without damage. The O-B Form-8 Coupler exerts a stabilizing pressure to counteract a mine car's normal tendency to derail under push or buff.

If you are considering the purchase of new mine cars, you will find it profitable to investigate the O-B Automatic Coupler—the coupler that was designed specifically to meet mine operating conditions. A postcard request will bring full information.

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd.,
Niagara Falls, Ontario



O-B AUTOMATIC COUPLERS

... Designed Specifically
for Mine Service



Make your coal mine a gold mine

It's as simple as putting a Bucyrus-Erie to work, for fast smooth-working Bucyrus-Eries, like the 1½-yd. 38-B pictured above, not only increase profits by boosting production, but save you money on operating and maintenance costs. Watch one of these shovels in action and see how responsive, full-feel controls speed the operating cycle for more passes every hour . . . how bal-

anced speeds and power, superior weight distribution and efficient front-end design contribute to smooth operation that's easy on man and machine alike. Notice the unusual accessibility and durable construction of machine parts that makes maintenance easy, keeps costs down. Then see your Bucyrus-Erie distributor for more details on the outstanding machines in the Bucyrus-Erie ¾- to 2½-yd. line. For latest information on larger machines, write

**BUCYRUS
ERIE**

**The BEST buy Bucyrus,
the best BUY in excavators**

158E49

Bucyrus-Erie Company
South Milwaukee, Wisconsin

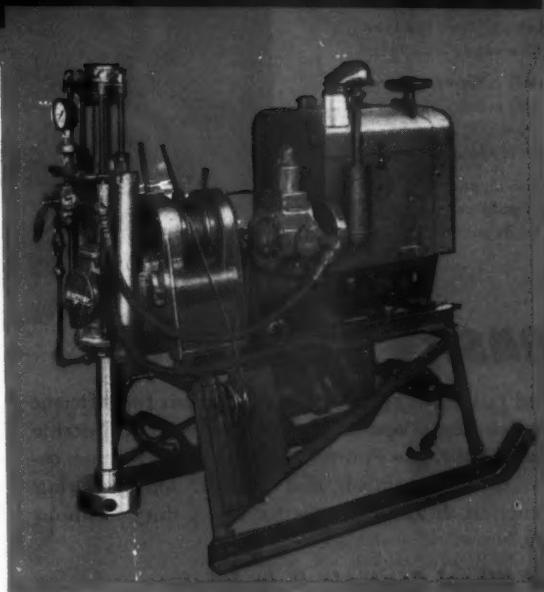
Core Drill your Properties

WITH
PIONEER STRAITLINES

- Prove up mineral values.
- Test for quality and depth of coal measures.
- Data secured will aid in planning production either by underground mining or by stripping.

PIONEERS MEET THE REQUIREMENTS OF YOUR JOB. You'll find the Pioneer Straitline easy to move because of light weight and frame mounting. Quickly set up for operation, test holes can be rapidly drilled all over your property. In mineral exploration you can drill to 600' recovering $\frac{7}{8}$ " core. Or if $1\frac{1}{8}$ " core is required, the capacity is 500'. When drilling coal measures, better coring results will be obtained with $2\frac{1}{8}$ " core. Your Pioneer will recover this size to a depth of 300'.

PLENTY OF POWER. The Pioneer is driven by a 10 h.p. water-cooled gasoline motor. The power is transmitted either to the drill head, or to the hoist through a sturdy clutch, and a 3-speed transmission. The built-in drum hoist will pick up the rod load smoothly. Hoisting speeds from 70 to 225 f.p.m. are available. Air or electric motors furnished if required.



HYDRAULIC TYPE DRILLING HEAD. The Longyear hydraulic swivel or drilling head gives the operator a sensitive and instantaneous control of bit advance. This is important in drilling areas of alternating hard and soft rock, or in penetrating seams of coal. The hydraulic head is operated by means of circulating oil supplied by a built-in oil pump. A screw feed swivel head can be supplied if preferred.

**USERS OF THE PIONEER IN BOTH THE HARD ROCK AND COAL FIELDS REPORT TOP PERFORMANCE.
YOU WILL FIND IT WELL ADAPTED FOR YOUR JOB. WRITE FOR BULLETIN J-69.**

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA, U.S.A.

NEW YORK OFFICE, 1725 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

**DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS**

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

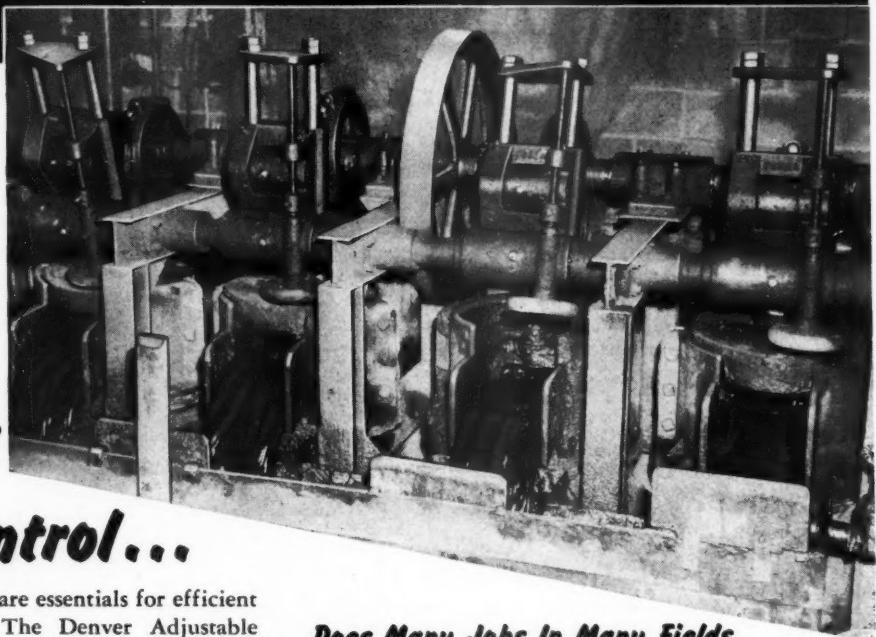
Control Large Volumes of Pulp

WITH A
Denver Adjustable Stroke Diaphragm Pump

This 6" Quadruplex Denver Adjustable Stroke Diaphragm Pump is doing a real job at the Tamaqua Colliery of the Lehigh Navigation Coal Company, Inc.

Material... Minus 6 mesh washery refuse (Underflow from 75' diameter Denver Hydroclassifier)

% solids in pulp... 35-45
Gallons pulp per min.... 600
Tons solids per 24 hrs.... 1450-2000



Density Control...

... and pulp flow regulation are essentials for efficient industrial plant operation. The Denver Adjustable Stroke Diaphragm Pump, with its large volume capacity, ease of control, and rugged, long wearing construction, is an ideal unit for heavy duty "24-hour service."

Hand Wheel Controls Pulp While Pump is Running

Simply turning the adjustable hand wheel changes the length of stroke and immediately alters the pulp flow to the required amount, *while the pump is operating.*

Rugged Construction Gives Long Life And "24-Hour Service"

The Denver Adjustable Stroke Diaphragm Pump is sturdily built to give trouble-free service. Molded rubber valve seats and diaphragms are long wearing and may be quickly replaced with a minimum of shutdown time.

Does Many Jobs In Many Fields

In coal washing...in copper, phosphate, potash and other concentrators...and in industrial plants... large volumes of pulp are being handled "24 hours per day," month after month with these heavy duty Denver pumps.

Wide Range of Sizes, Large or Small Capacities

Sizes range from 2" to 6" in Simplex, Duplex, Triplex or Quadruplex units.

A 6" Quadruplex Pump, handling 60% solids at 4.2 specific gravity, has a rated capacity of 3,140 tons per 24 hours. A 2" Simplex Pump under similar conditions has a rated capacity of 80 tons per 24 hours.

Let us help you solve your pumping problems. Write today for Bulletin P8-B for additional information on the Denver Adjustable Stroke Diaphragm Pump. Other bulletins also available on a complete line of ore dressing equipment.

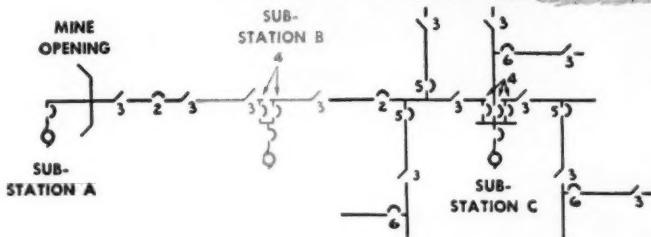


"The firm that makes its friends happier, healthier and wealthier"

DENVER EQUIPMENT COMPANY
P. O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG • RICHMOND, AUSTRALIA

How to boost production levels through proper sectionalization



APPLY THIS I-T-E SECTIONALIZING PLAN:

KEY

- 2 I-T-E Type KSC Circuit Breaker — installed in circuit between each two substations.
- 3 A disconnect switch or protective device placed at not over 1500 foot intervals in every power line.
- 4 I-T-E Type KSC Circuit Breaker (trip-free operating mechanism) — used as overcurrent protective device in each circuit leaving a substation.
- 5 I-T-E Type KSC Circuit Breaker — installed as overcurrent protective device at each main branch circuit.
- 6 I-T-E Type KSC Circuit Breaker — to protect secondary branch circuits (i.e. a circuit feeding only one local section or territory).

Note: In every case, sufficient feeder and return circuit capacity should be provided so that circuit breaker will be opened by a dead short at the most remote point of the circuit.

**Be Production-Wise
Sectionalize!**



S-E-C-T-I-O-N-A-L-I-Z-I-N-G

SWITCHGEAR

The Leader In Technical Excellence

I-T-E CIRCUIT BREAKER COMPANY, 19th & HAMILTON STREETS, PHILADELPHIA 30, PA.
31 OFFICES IN UNITED STATES • In Canada, EASTERN POWER DEVICES, Ltd., TORONTO

SWITCHGEAR • UNIT SUBSTATIONS • AUTOMATIC RECLOSENG CIRCUIT BREAKERS

• When electrical distribution systems are sectionalized with I-T-E Sectionalizing Switchgear, production levels are raised: time lost because of electrical disturbance is kept to a minimum, and safety to personnel and equipment is assured.

In the above application, the heart of protection is the I-T-E Type KSC Automatic Reclosing Circuit Breaker. The only circuit breaker designed especially for the mining industry, the KSC has ample flexibility for meeting changing mine conditions. Completely dependable, it is durable and efficient under the most severe operating demands. Rugged and compact for easy portability, it is also completely metal-enclosed for safety — yet readily accessible for inspections and maintenance.

The I-T-E representative in your locality can give you complete information on the I-T-E Type KSC Automatic Reclosing Circuit Breaker. He is also fully qualified to assist you in the adoption of recommended sectionalizing practices in your mine. Use his services with no obligation.

MOVING RED EARTH

in the Black



When you
SPECIFY CUMMINS
you get:

- Fast work cycles
- Fuel savings
- Low maintenance
- Minimum down-time
- Long engine life
- Warranty—100,000 miles or one year
- 'Round-the-clock service



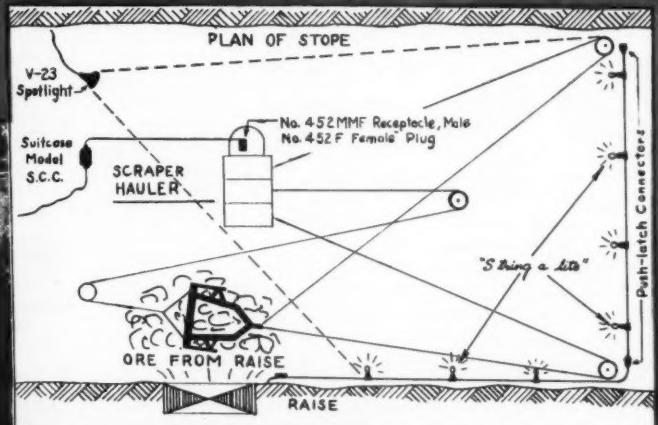
3,000 yards of overburden moved each eight-hour shift . . . 400,000 yards in the first 12 weeks on the job . . . that's the record of four Cummins-Powered Wooldridge Terra-Cobras being used by the Haley-Young Mining Company at the Elbern Mine near Chisholm, Minn.

Powered with Model HBISD-600 Cummins Diesels, these earth movers each maintain an average of 70 loads every eight hours on the one-mile round trip . . . carrying 11.5 yards of material each trip and working on grades up to 12 per cent. In this high-speed stripping operation, Haley-Young also uses six Euclid Rear Dumps and a Lima 1201 shovel . . . all powered with Cummins Diesels.

Write for more information about the proved performance and economy of Cummins Diesels.

CUMMINS ENGINE COMPANY, INC. . . COLUMBUS, INDIANA

PARTNERS in Production



MINES "String-a-lite" . . . Connectors . . . Distribution Centers

Since '2 MINES has specialized in designing and manufacturing molded "Neoprene" rubber Connectors, portable lighting lines and associated essentials for American mining. Whenever mining machinery moves or must be moved . . . MINES Safety Circuit Centers, Plugs, Receptacles and String-a-lite lines, simplify mechanization and increase the safety of portable power lines. Consult your nearest Joy Engineer for complete details.

A FSC—FEMALE OUTLET—used on MINES Weather-proof String-a-lite assemblies. Molded of Neoprene with Weather-seal. Accommodates ERS lamp socket (B below). Available spaced on lengths of cable to meet mining requirements.

B ERS LAMP SOCKET—used on MINES Weather-proof String-a-lite assemblies. Plugs into FSC female outlet (A above). Accommodates 100 watt standard Edison based bulb. Molded of "Neoprene".

C VPL-G—LAMP SOCKET—used on MINES Vapor-proof String-a-lite assemblies. Has metal guard and protective inner glass globe. Molded of Neoprene. Available spaced on lengths of cable to meet mining requirements.

D 82A187M MALE PLUG—used in MINES Vapor-proof and Weather-proof String-a-lite assemblies. Push-latch style with Water-seal. Cannot become disconnected accidentally. 82A187F—companion Female Connector.

E 452F—FEMALE POWER PLUG—integratedly molded in one piece to cable. Has wearing Neoprene jacket, low resistance contacts, moisture and dust seal. 452M—Companion Male Connector.

F 452 MMF MALE MACHINE RECEPTACLE—has Neoprene Insert with terminal block. Five connectors described in E above. Mounts directly on motor frame.

G V23 200 WATT VAPOR-PROOF SPOTLIGHT—supplied with metal mounting bracket and lens. Has wearing Neoprene jacket, low resistance contacts, moisture and dust seal.

SALES AND SERVICE TO THE MINING INDUSTRY EXCLUSIVELY BY
JOY MANUFACTURING COMPANY
 HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

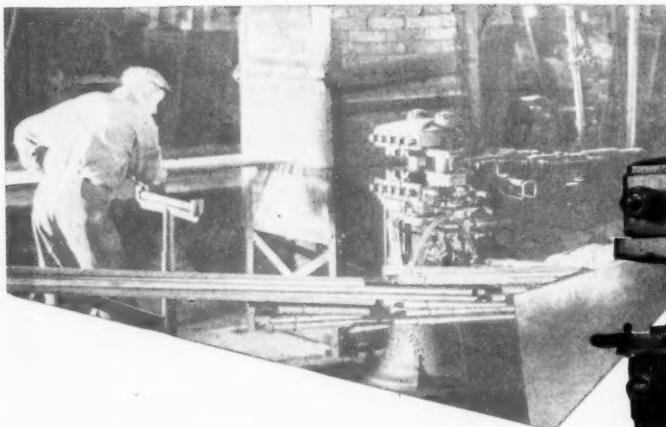
MANUFACTURED BY
MINES EQUIPMENT COMPANY

4233 CLAYTON AVE.



ST. LOUIS 10, MO.

Sharpen **ANY** drill steel faster . . . with less air!



—that's what you'll do when you have a Gardner-Denver Drill Steel Sharpener. Here's why: The ram is lifted by *constant air line pressure*—a feature found in no other sharpener. Lifting air is not exhausted on the down stroke, but is compressed back into the line. The ram raises *instantly* upon release of the down-stroke air . . . providing faster fullering and gauging . . . eliminating loss due to the discharge of lifting air.

The Model DS-6 Gardner-Denver Sharpener has increased clamping power, plus an exclusive tandem piston design that assures further air economy. Other reasons why these sharpeners give you properly formed bits and shanks for economical drilling are:

- ◆ **SINGLE THROTTLE VALVE HANDLE**—Conveniently placed at operator's right hand, controls all operations.
- ◆ **REVERSIBLE DOLLY HAMMER**—made of special alloy steel to withstand hard usage over a longer period of time.
- ◆ **LONG CLAMPING DIES**—steel can be clamped where it is cold and of full section.
- ◆ **TWO SETS OF FULLERING DIES**—sufficient for any ordinary range of bits.
- ◆ **NUMEROUS CLEANING DEVICES**—hose with blowing nozzle for upper and lower die blocks—blow gun for blowing out hollow drill steel—distinctive scale blower removes all scale from dies.

For further information, write
Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER

SINCE 1859



Gardner-Denver
DS-6 Drill Steel
Sharpener



Mining

CONGRESS JOURNAL

Published for the Entire Mining Industry

by the American Mining Congress
SHELDON P. WIMPFEN, Editor

MARCH

VOLUME 35

1949

NUMBER 3

Social Insecurity

IN his State of the Union Message to Congress, the President made 24 major recommendations. Of these, many were definitely Socialistic in origin, nature, and tendency. Included among such proposals were—expanded Social Security—reimposition of priorities and allocation of materials—authority to control wages and prices—government entry into production of steel and other commodities—extension of farm price supports—and development of additional public-owned power projects.

Socialization usually conforms to three principal patterns; overthrow of the existing order by a small but militant revolutionary group, as in Russia; changing the present system by a majority vote, as accomplished by British voters in 1945; or revolution by deception—preserving the form but dissolving the substance of free enterprise—through propaganda, usurpation of powers, and legislation.

On February 15, the latter method was invoked when the Administration-sponsored economic stabilization bill (H. R. 2756), which would translate many "State of the Union" proposals into law, was introduced in the House. This managed economy plan, although unlikely to become a law in its present form, strips the veils from the domestic economic road sign, and paves the way for unlimited government competition in business.

Under the enveloping provisions of the bill the President would have the power to fix maximum prices for all and any commodities which he deemed to be in short supply; to restrain wage increases in industries operating under these price-ceiling orders; to make Government loans and direct the expansion of facilities for increased production of any raw material or manufactured product and to build and provide for Government operation of plants when deemed necessary; and to establish a system of mandatory allocations and priorities on industrial commodities.

These and further autocratic powers provided for in the bill carry out thoughts like those of Dr. John D. Clark, a member of the President's Council of Economic Advisers who said "The enlargement of productive capacity is so essential to continued maximum employment that neither the concealed dangers in any given plan nor the required scope of government intervention should prevent action that would be effective."

Apparently these molders of national policy aim at having government controls and government management serve as a flywheel to even off the spurts and stalls inherent in any freely functioning competitive system. Perhaps they overlook the fact that an unhampered industry, developed by individuals and groups acting under

the incentive system, has been the motive power for our great economic achievement. Too big a flywheel can slow the prime mover to a halt and enslave us all to regimented statism.

Rights of Man

FEW laws that have been so beneficial to labor, management, and the general public have been subjected to such unwarranted criticism as the Taft-Hartley Act. This law, which came into being to protect from further abuse those parties affected by Federal labor legislation, has accomplished its objective, as the report of the "watchdog" committee revealed. Under this law organized labor has achieved a great deal for its members, and will take a progressive path in the years ahead, provided its members are permitted to retain the freedom which was restored to them by the Taft-Hartley Act.

Today the rights of the individual worker are endangered by Administration plans for T-H Act repeal and for reenactment of a modified Wagner Act. These proposed modifications threaten, among other things, to withdraw: the protection of American industry and of the American people existing in the anti-Communist provisions of the present law; the freedom of speech clauses which have accomplished much in clearing the labor-management skies of the clouds of misunderstanding; and the right to work. Certainly this last provision, along with the right to strike, warrants full recognition as one of the fundamental privileges of free man.

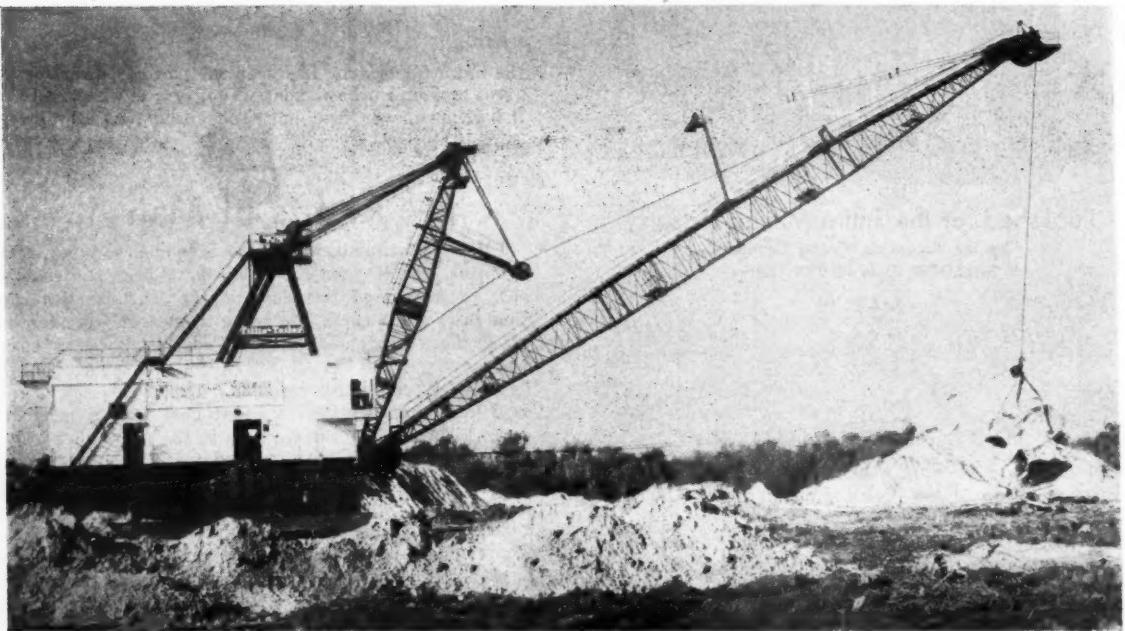
Examination of the existing law reveals many safeguards. The exclusion of supervisors from the definition of employees has clarified the status of this group, improved relationships with the men under their direction, bettered morale, and permitted operations to proceed with increased efficiency. With their loyalty undivided, supervisors have been enabled to discharge their vital duties of enforcing safety codes and State mining laws without fear or favor.

That collective bargaining be conducted in good faith, by both management and labor, is an essential part of any good labor law. Although now required, this equal obligation on both parties to bargain in good faith is omitted in the Administration proposal. Since enactment of the T-H Act this safeguard has protected the majority from the incautious acts of that minority not interested in good employer-employee relations.

Amendment of the present law, to exclude central union welfare funds from the field of required bargaining, is needed to eliminate the dangers inherent in the creation of preferred classes with exclusive benefits. The American people should not be required to pay for special security for union members.

Temporary restraining orders, now obtainable against jurisdictional strikes and against national emergency strikes, would no longer be possible if the Administration's labor bill became a law.

Passage of this piece of legislation would be a colossal backward step. The crises suffered in the past would again be perpetrated upon the American people. It would seem reasonable to conclude that law-makers will recognize the orderly and encouraging influence of the Taft-Hartley Act and retain its beneficial provisions, in strengthened form, to protect the fundamental rights of all the people.



"Tillie the Toiler" handles phosphate matrix with a 16-cu yd bucket

Heavy Equipment Mines Florida Phosphate

Machinery Characteristics Govern Mining Methods
and Pit Output

By IRVING S. TILLOTSON

Mining Superintendent
International Minerals & Chemical Corp.

FLORIDA PHOSPHATE rock occurs in beds of matrix overlaid with overburden, both strata being generally level and of varying thickness. Generally, the combined depth of overburden and matrix does not exceed 50 ft. It is rarely economical to mine a stratum of matrix with a lesser depth than 5 ft and, unless the deposit of matrix is exceedingly rich, it is unprofitable to mine a deposit with more than 40 ft of overburden. Mining cuts are laid out from data obtained by prospecting and the location and direction of cuts is governed by limitations in the following order of importance:

- (1) Cuts must supply the grade and quantity of phosphate currently in demand

- (2) Mined-out pits must be immediately available as a settling basin for waste water from milling operations
- (3) Ground water must flow by gravity in the mined-out pit and in a direction away from active mining.

The mining unit consists of one or more draglines which strip the overburden, mine, and move the matrix to a pump sump where it is picked up by a pump and carried to the milling plant where the phosphate rock is extracted.

At all times the dragline must be in reach of the pump sump and whenever mining proceeds beyond this point, the pumping unit must be moved. In moving matrix from the

pit to the pump sump, pumps must always be located so as to give a minimum swing for the draglines, which swing rarely exceeds 120 deg.

The distance between successive pump locations varies with the type of dragline or draglines used, with the length of their respective booms, and with the width of the cut. The time interval between pumping unit moves varies from one week to ten days, according to these conditions and the depth of overburden and matrix.

Matrix pumping units at all of International's mines are identical, consisting of 12 in. dredge pumps, directly connected to 300-hp, 600-rpm, 2300-v, slip-ring motors housed in portable steel cars. One or more booster pumps are located in the line, depending upon the distance between the mine and the recovery plant. Pumps supplying water for mining vary with the type and quantity of matrix pumped. It is necessary to use water at high pressure to break up stiff clay matrix. Water must be supplied in sufficient quantity so that the resulting pulp of matrix and water will not exceed 33 percent solids by weight. One of International's pumps supplies water at the rate of 4000 gpm against a 467-ft head, and another supplies 6000 gpm against a 250-ft head. All International's clear water pumps are di-

rectly connected to synchronous motors and are housed in portable cars.

Electric power for operating the mines is purchased locally. The local power company brings power to its own centrally located transformer bank at each mine. From this point company transmission lines at 12,000 v run to transformer stations that serve the pit and draglines. Company transformers are mounted on steel sleds and are moved about in the mining area as needed by D-8 Caterpillar tractors. Power for pit pump motors is supplied at 2300 v through three-wire, rubber-insulated, neoprene-covered cables.

Each initial pumping unit or pit car, as it is known locally, is supplied with 1500 ft of rubber-insulated cable with a neoprene jacket, and is also supplied with a steel sled on which to carry the cable. The 1500 ft of cable consists of two units—between the car and the junction box on the sled, 500 ft; between the sled junction box and the transformers, 1000 ft. The sled provides protection to the cable when not in use. When the pit car is near the transformer, surplus cable is coiled on the sled in a figure 8. As the car moves away from the transformers the cable is paid out from the rear of the sled and placed on the ground.

The initial pump, or pit pump, which is fed by the draglines, is manned by a mine foreman, (who is also in charge of all booster, drainage, and mining water pumps) one suction tender and two gunners. The clear water pump is operated by one man, who will also operate a booster pump if a booster is located near his station. Other booster pumps have their own individual operators, as these pumps must be synchronized with the pit pump.

Variations in this method of stripping overburden and matrix depend upon capacity of the dragline and are also influenced by the depth of overburden. When the dragline has sufficient capacity to keep the washer and flotation plant in continuous operation, it throws the overburden into an adjacent mined-out cut and supplies the pump with matrix.

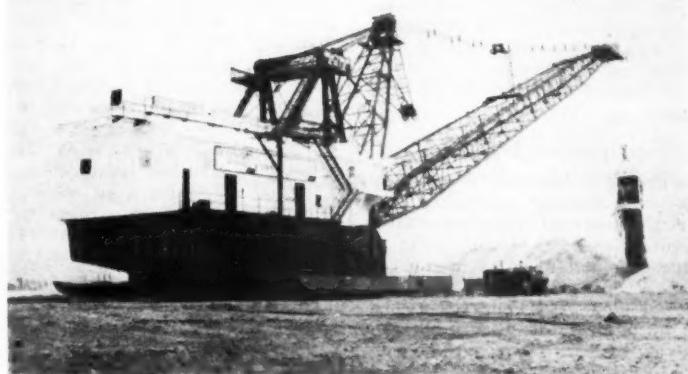
Mining Cycles

Matrix is stacked in the well by the dragline in quantities sufficient to permit several hours of uninterrupted pumping. During pumping the dragline is stripping overburden. Where it is necessary to use two draglines to keep the plant in full operation, one of the following methods may be used:

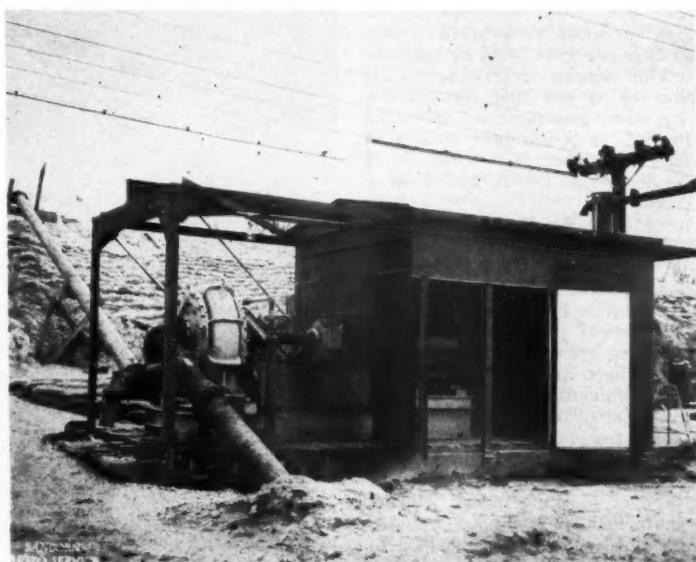
(1) One dragline moves ahead, stripping overburden and throwing it into the mined-out cut. The second dragline, following, mines the stripped matrix and also widens the cut by stripping and mining an additional width.



An 8 1/2-cu yd bucket swings from this dragline's 150-ft boom



"Bigger Digger" can move 1550 cu yd per hour with a 21-cu yd bucket



Booster pump places tailings in mined-out pit

(2) Two draglines are located abreast; one machine near enough the mined-out pit to permit overburden to be thrown into it. The machine located farthest away from the mined-out pit throws its initial overburden into the cut just mined by the first machine and the remaining overburden is thrown into the second machine's own mined-out front and side. In the latter method of mining the draglines are spotted so that either machine can reach into the other's side-cut by from 10 to 20 ft. Actually the areas covered by their booms will overlap.

This latter method of mining has the following advantages: all the dragline capacity is currently available; the maximum width of cut may be taken, thus holding to a minimum time lost in moving draglines and pumping equipment; and in case of a minor breakdown of one machine, the second can keep the mine in operation until repairs are made.

When mining with two draglines abreast, the pit car is located in the rear of and between the two draglines. Using two machines abreast for mining has proven advantageous where the overburden does not exceed 25 ft in depth.

Equipment Utilized

International Minerals & Chemical Corp. is currently operating five electrically-powered draglines—three Bucyrus-Eries, an 1150-B, with a 215-ft boom and 21-cu yd Red Arch bucket; a 650-B with 175-ft boom and 16-cu yd Red Arch bucket; and a type 175, with 135-ft boom and 5-cu yd Page bucket. Two are Marion type 360 machines with 150-ft booms and 8½-cu yd Page buckets.

Since going into operation January 1, 1946, the 1150-B has been in continuous operation three shifts a day, seven days per week, with no lost time for major repairs or breakdowns. It is powered by one 1250 hp and one 500 hp motor-generator set operating at 4000 v. It is equipped with a 50 ft diam tub. Dumping height is 93 ft, digging depth 130 ft, and digging reach 208 ft.

The 1150-B dragline is equipped with twin 1½-in. hoist cables and 2¼-in. drag cables. Over a period of 29 months, some good others bad, the 1150-B dragline has moved dirt at an average rate of 1420 cu yd per hour, on a digging cycle of 1.13 swings per minute. There has been during this period, peak months when the machine has averaged 1480 cu yd per hour. Except for a few days at a time, it has never been necessary to run at peak capacity. For the service required of this type of machine in the Florida phosphate field, it is highly probable the machine could be depended on to move dirt, day in and day out, at the rate of 1550 cu yd per hour.

Operation of this dragline began with a type "B" Red Arch bucket, which was removed from service for repairs on September 1, 1946, after having moved 3,364,499 cu yd of material. The first bucket was replaced by a bucket of the same type which operated through July 24, 1947, before being removed for repairs. The second bucket moved 6,135,435 cu yd of material or nearly double the amount moved by first bucket. There seems to be no explanation for the poor performance of the original bucket; however, after repairs and rebuilding the bucket went back into service in July 1947, and remained in service again until April 1, 1948, moving 5,227,354 cu yd before it was removed for a second repair job. This bucket is still serviceable and it is probable that, with proper maintenance, the Red Arch bucket can be depended upon for at least 15,000,000 cu yd.

During the 29 months in which this machine has been in service, drag and hoist cables from several different sources have been used. American Steel and Wire Co. cables have given excellent performance, one set of hoist cables having moved 3,038,000 cu yd and one set of drag cables moved 2,082,000 cu yd. Both of these figures are considerably above the average of 1,650,000 cu yd for hoist cables and 1,500,000 cu yd for drag cables.

The economy of twin ropes versus single ropes appears to be a stand off; however, the cost of drag and hoist

cables per cubic yard of material moved is slightly less for the single rope. The basis of this comparison is the 1150-B dragline using twin ropes, as against other draglines using single 2-in. drag and single 1½-in. hoist cables.

International placed a 650-B Bucyrus-Erie dragline in service in March 1948. Data now available indicates that the 650-B and the 1150-B draglines have the same dumping cycles and that the 650-B dragline will move dirt in the same ratio that its 16-cu yd bucket bears to the 1150-B's 21-cu yd bucket.

The 650-B dragline has a dumping height of 88 ft, a digging depth of 95 ft, and a digging reach of 165 ft. It uses twin 2½-in. diam drag cables and a single 2½-in. diam hoist cable. Both the 1150-B and the 650-B draglines are equipped with Westinghouse Rototrol controls. The 650-B dragline is powered by two 650-hp motor generator sets.

International's draglines operate on a three-shift per day, seven days per week schedule. Each shift is manned by one operator, one oiler and one ground man.

Dragline cuts vary in width depending upon the type of machine used. A standard width cut for the 650-B dragline is 200 ft and for the 1150-B dragline, 250 ft. By using a Marion dragline, type 360, working abreast with a Bucyrus-Erie type 175 dragline, a cut 500 ft in width can be taken.



Typical mining setup. Steel pit car-housing dredge pump in left foreground. Peace Valley washer and flotation plant in background.

Structure of Mine Roof

Research to Develop Further Knowledge of the Geological and Chemical Characteristics of Mine Roof Strata Will Lead to Better Methods of Roof Control

By CHARLES T. HOLLAND

Head, Mining Department
Virginia Polytechnic Institute

WATER DEPOSITED the materials comprising the rocks which form the cover of coal seams and they were subject to all the sedimentation variables occasioned by the source and type of material as well as the conditions of deposition. Therefore, in mine roof it is not reasonable to expect any mineralogical composition or physical property to remain constant for any appreciable distance either horizontally or vertically. The materials so deposited, moreover, were subject to pressure of compaction as additional sediment accumulated, in addition to tangential forces which may have been set up within the earth's crust from a variety of causes. Such being the case, it is readily apparent that the overlying strata of coal beds must be formed from structural material that is highly heterogeneous, a fact which causes much uncertainty as to mine roof action, and which is fundamentally the cause of much of the roof control trouble experienced. Therefore, a brief consideration of some of the geological structural features and characteristics of the rocks composing coal mine roofs may be of interest and possibly of some help in solving roof support problems.

Bedding Planes

Bedding, the layers or sequence of layers in which the rocks forming the mine roof were laid down, may be comparatively thin laminations, or may consist of a thick massive deposit, which may be shale, sandstone, or rock grading between the two. The kinds and variations of the strata as illustrated in Figs. 1 to 5 could be multiplied almost without end, and an examination of the illustrations will readily indicate that the bedding of the rocks can and does influence the behavior of a mine roof.

A further determining factor in the distance that a roof will span is the amount of bond between the separate

bands or beds. Between thin coal bands and overlying or underlying beds of shale, sandstone, or limestone, the bond or cohesion is often quite small or nonexistent; the same is true between distinct beds of shale, sandstone, and limestone. Strata of like material, but differing in texture and color, may be equally as well bonded as a rock that appears to be uniform in texture or color, and where the beds gradually change from sandstone to shale or limestone the bond is likely to be good. Where many fossilized imprints of plants or concretions are found on the bedding plane, the bond is usually quite low or nonexistent.



Fig. 1. Immediate roof of the Pittsburgh coal bed. Note the many thin bands and the joint planes at A and B. The strata succession is draw rock, rooster coal, draw rock, rider coal, and black jointed shale. The small white scale is 6 in. long



Fig. 2. Immediate roof of the Sewickley coal. Note the banding of the beds and how the beds have fallen apart at the bedding plane in the fall to the left

Rock Joints

Joints in rocks are fractures along which no visible displacement has occurred and, in the strata overlying coal beds, are found in all the rocks which are brittle enough to form and maintain fractures. These usually occur in pairs, one joint plane being approximately perpendicular to the other. The directions of the planes are frequently roughly parallel to the face or butt cleat of the coal, but considerable divergence may occur. (See Figs 1 and 6.) The plane of the joint, where the strata are horizontal, is usually nearly vertical, although it is not a rare thing to see the planes in roof rocks making angles as great as 20 to 30 deg with the vertical. The spacing of the joint planes may vary from a matter of a fraction of an inch in shales to hundreds of feet in sandstones, and they may extend from a few inches to several hundred feet or further. A joint plane may cut a stratum 25 to 30 ft thick from top to bottom; it may be discontinuous at the top or bottom, or it may cut through another stratum of rock.

Joints affect mine roof action in several ways. Since they are clearly fracture planes, they definitely limit the length over which a stratum can act as a beam. Joint planes spaced only a few inches to three or four feet or so apart clearly preclude beam ac-

(Extract of paper presented to the West Virginia Coal Mining Institute.)

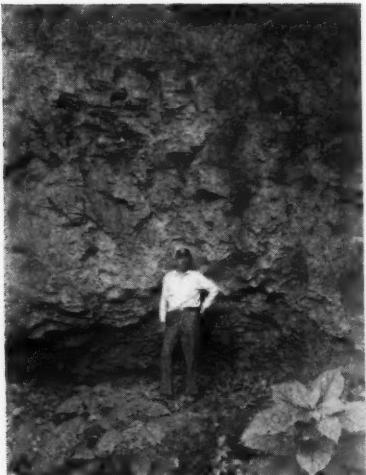


Fig. 3. Immediate roof of the Pittsburgh coal in Braxton County near Gerwig

tion of the roof rocks; in such a case, the mine opening must be spanned by arch action, a fact that several writers on roof action have overlooked. Also, where the joint plane is smooth, it forms a plane along which the roof rock may shear quite easily, and if this occurs within a few inches of the rib of room or entry, it is certain to increase the likelihood of a shear failure along that rib. A well developed system of joints in thin laminated beds greatly increases the probability of roof failure if they are called upon to span a passage way.

Erratics in Mine Roofs

Fossil remains of trees in place, ranging in size from a few inches to two or more feet in diameter, are often found in mine roofs. Frequently these fossils are concealed by a thin layer of rock and, therefore, give little or no indication of the hidden danger above. Their conical shape and the almost complete lack of bond, due to the coal skin and slickensided surface, allow these rocks to drop from the roof with little or no warning. The most careful search may fail to reveal their presence, and better methods are needed for their detection and support.

Clay veins in the coal usually come from the roof. In the vicinity of these veins the roof is often badly disturbed and is likely to have little ability to support itself. Fracture planes may exist in mine roof, even where clay veins are not present, and account for many of the so-called kettle bottoms and horse backs that are found. Like rock tree stumps, these call for the development of better methods for detection.

Boulders are also found in mine roofs, either directly on top of the coal or covered by the material forming the roof. They may be slicken-

sided and have little bond with the roof itself, and vary in size from an inch or so to a foot or so in diameter. Often mistaken for boulders, concretions of iron sulphide, siderite, and limestone are also found in the mine roof. Such concretions, like boulders, may be small or they may be a foot or larger in diameter, and like boulders, they are frequently slickensided.

Another condition not infrequently found in coal mining is an abrupt change in the kind of rock forming the roof; for example, due to a change of conditions the shale may be removed by erosion and sandstone subsequently deposited. The bond between the two rocks under these conditions is likely to be poor and the rocks at the junction may show considerable fracture. A condition such as this is almost certain to cause roof trouble in any passageway driven close to it. Another interesting condition sometimes found where the overburden is com-

Table I. Lateral Stresses at Various Depths in Beds of Different Materials.*

Depth in ft	Lateral Stresses Approximate value in lb per sq in.	Shale psi	Sandstone psi	Coal psi
250	28	15	100	
500	63	31	250	
750	107	48	420	
1000	166	66	666	

* By formula :

$$\text{Horizontal Force} = \frac{\text{Vertical Force}}{m-1}$$

when m is Pisson's number for each class of strata.

portant effects upon the actions of the roof of a passage way through the strata. The lateral stress will be relieved, at least partially, in the beds which are cut by the passage way especially in its immediate vicinity, but it will not necessarily be relieved



Fig. 4. Immediate roof of the Sewell coal. Note the heavy massive sandstone. The coal is $3\frac{1}{2}$ ft thick

paratively thin is shown in Fig. 8. The overburden here is approximately 40 ft thick. Mud cracks have formed at intervals of 20 to 25 ft and reach from the surface to the top of the coal bed. Needless to say, such conditions are certain to have an important effect upon roof action, as such cracks allow water carrying oxygen from the surface to reach the immediate roof of the coal and cause weathering.

Stress in Roof Rocks Before Mining

Before mining operations have begun it is clear that the roof strata must of necessity bear the accumulated weight of the overburden. Not so well understood, however, is the fact that the weight of the overburden must set up a horizontal compressive force which, in cases where the strata are horizontal or nearly so, must act approximately parallel to the bedding planes. The magnitude of the lateral force is calculated in Table I. This horizontal compression can have im-



Fig. 5. Heavy sandstone with a thinning band of shale underneath. The rock over the Pittsburgh coal here is 40 ft thick



Fig. 6. Joints in roof beds over Lower Kittanning coal near Norton, W. Va. The strata succession is mined coal bed, draw rock, rooster coal, draw rock, black jointed shale, and jointed shale. Note that the joints in the black shale make an angle of about 25 deg with the joints in the upper shales

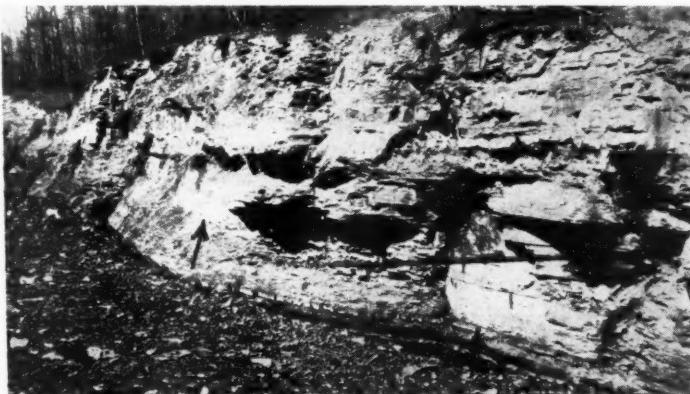


Fig. 6-A. Joints in the overburden of the Lower Kittanning coal

in the beds overlying the passage way. Consequently, at the roof and floor, considerable shear stress may be developed. As the overburden becomes thicker, lateral stresses become more intense until they begin to cause the failure of the roof stratum.* At lesser depths than these, such forces may be of help by furnishing the

thrust so a roof strata with joints can span the passage way in flat arches; this may explain, in part, why coal, even though it be closely jointed, makes a better roof than some shales, especially at shallow depths. With increased overburden, however, coal may lose this advantage.



Fig. 8. Weather cracks at joint planes. The arrows point to the weather cracks

Plasticity of Beds

When mine passage ways are driven, the immediate distribution of the resultant stress changes is determined to a considerable extent by the elastic properties of the rocks forming the overburden and the subjacent strata. Equally important, although not so generally recognized, upon the final distribution of the stress are the effects of the plastic properties of the roof and floor rocks. Considerable information is available concerning the elastic properties of rocks, but data upon the slow creep and flow of rocks under stress are meager. Limestones and sandstone probably show a high order of rigidity. This is not necessarily true of shales and under a comparatively small stress an appreciable creep may occur in a comparatively short time. Evidence in mines of such creep is given by heaving floors and even by the clay veins found in coal



Fig. 7. Fossil tree in rock over No. 2 gas coal near Ansted, W. Va. Note the coalified bark (indicated by the arrow)

beds. Greenwald, in tests upon a shale beam, found that a stress of only 94 psi caused a creep of nearly 0.009 in. in approximately five days.† Griggs tested a shale specimen which developed a creep of 2½ percent in a period of about six months, at the end of which time movement became slow or stopped completely.‡ More research concerning the flow of rock under stress would yield considerable information of value in roof control.

* Phillips, D. W., "Research on Strata Control in Great Britain," *Coal Technology*, November 1946.

† Greenwald, H. P., "Roof Sealing to Prevent Slate Falls," *MINING CONGRESS JOURNAL*, March 1944, page 54.

‡ Griggs, David T., "Creep of Rocks," *Journal of Geology*, Vol. 47 (1939), page 242.

How the Greater Butte Project Was Born

MEMBERS OF the Anaconda Copper Mining Co.'s geological and mining departments at numerous times in the past have given consideration to the possibility of block caving the entire horsetail ore and certain wide vein areas in the central east section of the district. Three supposed unsurmountable problems; namely, the handling of large quantities of old timber from square set stoping operations of the past; fire, gas, and potential fires in certain isolated sections; and doubtful ore grade, always caused postponement of thorough investigations.

However, experience in other mining districts has demonstrated that old stope timbers are not a serious handicap to block caving operations, and in Butte the successful elimination of fire and fire gas in certain areas has been accomplished by filling all mine openings with concentrator tailings. Concerning grade, the probabilities appeared reasonable that the areas under consideration should contain at least as much and possibly more copper a ton than the waste dumps from development and sorting, accumulated during high grade, selective mining operations of the past. The dumps from the horsetail mines had been satisfactorily sampled on a large scale, subsequently shipped, and found to average 1.05 percent copper. Therefore, the overcoming of the supposed problems seemed possible and a thorough investigation of reserves suitable for the caving system of mining was started.

Accurate geological data accumulated during the past 50 years of mining in Butte made it possible to determine the existence of the low grade orebodies of the Greater Butte Project with a considerable degree of certainty without requiring new development and sampling. Using these data, tonnage estimates were made that required only minor adjustments after a development and sampling campaign was completed.

The Greater Butte Project orebodies are located in the central east section of the district in the area extending eastward approximately 2000 ft from the Anaconda shaft, in the largest intensely altered and multi-fractured granite section of the area. This ore occurs in two different structural types, the horsetail and the wide vein zones.

The horsetail zones are so named

Development, Sampling, and Block Caving Tests Were Foundation of Great Plan

By CHESTER H. STEELE

Mines Geologist
Anaconda Copper Mining Co.

because of the resemblance to a horse's tail of the traces of the planes of the various units on a horizontal plane or mine level map. The ore in these areas occurs in numerous northwest-southeast striking veinlets with a stockwork of connecting stringers containing irregular lenses and disseminations of copper-bearing sulphides associated with quartz and pyrite. Chalcocite, enargite, and lesser

er Butte Project plans are to remove large volumes of these remaining copper-bearing materials by low cost block caving.

The wide vein zones are those where past stoping has been confined to relatively wide east-west striking, closely spaced, parallel veins between which connecting stringers, unprofitable to stope by presently used methods, are located. These, with the intervening

The Greater Butte Project, announced and named by C. F. Kelley, chairman of the board of directors, Anaconda Copper Mining Co., will augment present mining in the Butte district. In general, this project has been planned to accomplish the mining of material that was formerly considered as waste. The success of the undertaking is necessarily predicated upon the metal content of material lying between old stopes, and waste filling sections previously mined out, plus a low-cost method of mining. Here a man intimately connected with the project since the inception of the idea presents the details of the important preliminary work.

amounts of bornite are the principal ore minerals. The long horizontal dimension of these areas is northeast and southwest at right angles to the veinlets, but the same in strike as the principal veins representing them near and at the surface. This peculiar type structure is the result of mineral-bearing solutions having filled sections of minute fractures resulting from a movement of the granite along the long horizontal axis of the deposit. The largest orebody of this type is 100 to 400 ft wide and 1600 ft long, and extends from 175 ft above the 800 to the 3400, the lowest well developed level. Past mining was confined to the high grade horsetail ore streaks and concentrations of high grade stringers and disseminations leaving the intervening waste and numerous closely spaced stopes filled with copper-bearing gob formerly considered waste. The Great-

altered, mineralized granite, old stope filling, and small quantities of unmined regular reserves, constitute this type. Although narrower than the horsetail areas, the largest is 100 to 200 ft wide, 1100 ft long and extends vertically from the 200 to the 1200 level. The ore minerals are the same as those in the horsetail areas.

Numerous faults and fault veins are known throughout the various sections under consideration, but they have little or no importance in relation to the proposed plan of mining.

Viewed as a whole, the most important geological facts pertaining to the project are the large dimensions of its various zones, the satisfactory copper content, and the fact that the altered, multi-fractured nature of the ore-bearing granite is particularly adapted to block caving on a large tonnage, low cost scale.

Development Provided Ore Samples

Preliminary tonnage estimates indicated the existence of 12 possible block caving zones or areas containing from 2,500,000 tons in the smallest to 51,000,000 tons in the largest, the total for all 12 being in excess of 100,000,000 tons. Original estimates of grade were that this material contained at least 20 lbs of recoverable copper a ton, with minor amounts of silver and gold.

Consideration of the above tonnage and grade data showed conclusively the necessity of obtaining more accurate information to prove the actual existence of this large tonnage of low grade ore. Recent experience determining the grade of irregular and sparsely mineralized material in mine dumps had shown that only by shipping large representative quantities through the Anaconda Copper Mining Co.'s Washoe Sampler could an accurate average assay grade be determined. Plans were made, therefore, to obtain large representative quantities of material from the most important of the 12 possible block caving zones by extending a crosscut along the center line at approximately right angles to horsetail stringers and old filled stopes. The horizon selected was the Tramway 1700 and Leonard 1800 levels where ventilation conditions could be controlled satisfactorily and where no fire gas was expected. All excavated material from this crosscut was to be shipped to the Washoe Sampler for final sampling and assaying, the plan being to advance this crosscut the total length of the zone, 1600 ft, and if block caving type ore was found, parallel crosscuts would be located on each side, two-thirds of the distance from the center line to the supposed zone boundary. Old caved or open sills were to be avoided by advancing these development crosscuts from raises on the fourth floor or 23 ft over the level. This also would provide chute storage space for the newly excavated sample material, all of which was to be "slushed" from the crosscuts into these raises. Plans were made to accomplish rapid completion of this long crosscut by advancing simultaneously from seven raises, thus avoiding the necessity of slushing much in excess of 100 ft in each direction.

Assay returns from the first line of crosscuts were satisfactory and showed conclusively that further investigation was warranted. Thereupon, the other crosscuts as planned, were driven and even higher grade material was exposed.

Results from the 1700-1800 horizon work proved the existence of an area of 662,000 sq ft of block caving type ore and, thereupon, investigation of this zone at the 900, 1200, and finally

the 2200 level horizons was undertaken. Development and sampling procedure on these levels followed that used on the 1700-1800, and the assay results obtained from the sampling of each line of crosscuts checked so nearly those obtained from the first horizon that with similar geologic structure known to exist on all intervening and deeper levels down to the 3400, further work was not considered necessary in this largest of the estimated block caving zones.

Four of the smaller tonnage orebodies are located at higher elevations than the top of the largest or main orebody and must be mined first. All of these are of the wide vein type and, therefore, proper investigations of them had to be accomplished by extending crosscuts at intervals of 150 to 200 ft across the major structures and gob, and also across the intervening veinlets at near enough right angles to supply representative material. This work proved that one of the smallest estimated zones is too low grade to be considered further and showed that certain boundary lines should be altered somewhat, the net result being a relatively small reduction in the estimated tonnage but an increase in grade.

A summary of the footages of development work shows that aside from many thousands of feet of repair work and raising required to gain access to proposed crosscut locations, a total of 20,848 ft of crosscutting has been completed, 75 percent being inside of orebody boundaries and 25 percent outside.

Diamond drill prospecting was used to a limited extent. It was confined to many short holes, principally to determine ore boundaries in areas free of gob.

Four Types of Samples Proved Orebody

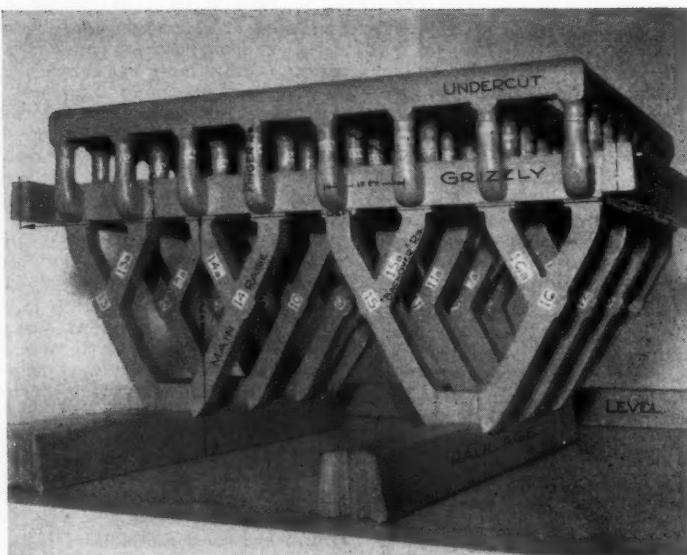
There being justifiable concern over the possibility of accurately sampling the material in the supposed block caving orebodies, the plans followed provided stockpile samples consisting of 94 percent of the total material excavated from each uniform cross-section crosscut having dimensions of 5 ft wide by 7 ft high. These representative large tonnages were sampled and assayed at the Washoe Sampler. Obviously, unreliable averages would result if irregularities in cross-section excavation occurred in materials of varying grade and, therefore, every effort was made to maintain uniform sized crosscuts. In the few places where loose material caused excessive breaking, investigations showed that average grades were affected only 0.01 percent copper to 0.05 percent copper and, therefore, could be ignored. In addition to the stockpile samples and in order that day to day

determinations would be available for guidance, hand cut and underground mine car samples were obtained, and finally surface larry car samples containing the remaining 6 percent of the total excavated material were taken. Each of these types served a definite purpose and the final results from each set supplied additional proof of the existence of the Greater Butte Project orebodies.

Hand cut samples were taken in the usual manner of chipping the entire exposure along each side of each crosscut. Veins exceeding 6 in. in width and gob were sampled separately and no single sample included more than 5.0 ft of crosscut length. Four lbs a foot were obtained from each side or 8 lb a foot of crosscut. The vein material and the altered granite varied sufficiently to make it necessary to weigh each return by specific gravity and width represented when computing averages. Also, gob sample measured widths were reduced 25 percent to represent "solid equivalent length" of crosscut. This factor was determined as a general average for moderately consolidated gob and proved to be accurate by numerous weight tests. Hand cut samples, in addition to serving as a check on other types, provided the day to day data used to determine exact ore boundaries.

Underground mine car samples were obtained at or near chute mouths by loaders scooping 1 lb of material from the top of each small mine car, or 5 lb from the top of each large car as loaded, this amounting to an average of 5 lb per foot of crosscut. Accumulations were made for each eight hour loading and averages were calculated for each two weeks period by weighting by the number of similar type cars sampled and specific gravity. This result was assigned to the "solid equivalent length" represented for comparison with cut samples for the same section.

Surface larry car samples were accumulated at the bin dumping point on the surface by an arrangement whereby material from the larry cars (8.0 ton cars used to transport ore from surface skip pocket to bins on the railroad) was split when dumped, one-half going to the bin direct and the other to a sheet steel platform from which shovels removed 120 lb a ton or 6 percent of the total by filling a small mine car to a predetermined depth. This material was dumped into a separate bin and, upon the accumulation of 50 tons, it was shipped to the Washoe Sampler for sampling and assaying. Also, at this point, a 10.0 percent cut of representative material was removed for laboratory concentration testing in the research department at Anaconda. A combination of larry car sample grades weighted by tons served as a



Model shows development beneath Test Block No. 1 of the Greater Butte Project

preliminary estimate of the grade of the remaining 94 percent of the material constituting the stockpile sample.

The stockpile samples containing from 70 tons to 2700 tons were shipped separately in special cleaned railroad cars through the Washoe Sampler where each lot of three car-loads (150 tons) or less was sampled separately and the results combined by weighting by dry tons. These combined with the larry car sample results provided an average grade of all excavated material from each section of each development crosscut 100 to 250 ft long. The individual assays were combined and averages for entire crosscut lengths were obtained by weighting by specific gravity and solid equivalent lengths to obtain the finally accepted average grade of each complete line of development.

The entire stockpile sample material, totalling 70,913 dry tons, was shipped to the research department at Anaconda where it served as feed for a 500 ton a day concentrator unit. The grade of each sample was checked as fed into this plant and concentrator recoveries of copper, silver, and gold were determined on a scale comparable with actual practice.

A comparison of the four types of sample assay averages showed that although in isolated cases the reverse was true, generally hand cut sample results were the lowest grade, larry car samples were the highest, and underground mine car and stockpile shipment sample averages were in between and checked reasonably well. An important fact however, is that even if the lowest average is considered correct, 20 lb of recoverable copper

per is indicated as the content of these block caving orebodies.

Crosscut averages for the mine levels sampled in each orebody, were weighted by specific gravity and solid equivalent areas represented to obtain an average grade for each horizon. These results were combined by weighting by the tonnages represented by each sampled level, the tonnages having been calculated by determining the proportion of the volume formerly excavated to the solid material remaining, and by using 25 cu ft a ton to obtain the tonnage of filling and 12 cu ft a ton for the unstopped material. Using these factors at least 130,000,000 tons of minable ore is indicated above the 3400 level, 11.4 percent of the total by weight being gob and 88.6 percent solid. Originally estimated ore boundaries required only minor changes after completion of this, the largest development, sampling and concentrator testing program ever undertaken in the Butte district.

Test Blocks Demonstrate “Caveability”

To determine the "caveability" of Butte fractured, mineralized, granite containing old and new stope filling and timber; to determine the possible difficulties from large sized material choking chutes; and to indicate development and repair costs that might be expected, a decision was made to prepare and cave a block 100 by 136 ft in area. Accordingly, a site was selected at the extreme east end of one of the smaller zones, the Mountain View or No. 6, where surface subsidence would be unimportant and no existing shafts would be involved. The

haulage level was established on the St. Lawrence 600 at 735 ft below the surface and 400 ft below the barren oxidized zone. The proposed block contained three gobs, one old and two relatively new, and the orebody extended diagonally across it both in dip and strike. The grizzly level was established at 52.5 ft above the bottom of the haulage crosscut and the undercut level at 18.0 ft above the grizzly. The usual chutes were established between the haulage level and the grizzly level, and the usual finger raises from the grizzly to the undercut level. The undercut level being 13,600 sq ft in area and there being 64 finger raises, each one provided an opening for 212.5 sq ft of undercut level.

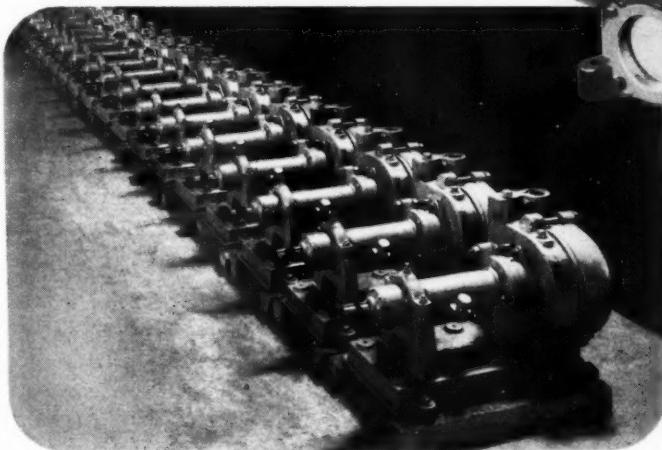
Development work below the block was completed in four months and a small amount of vertical boundary weakening was done along the footwall portion near the corner where undercutting was started. This work consisted of a raise, size 4 by 4 ft by 21 ft high with enlargements on two sides 4 ft by 7 ft for 17 ft of the height. After one-fourth of the area was undercut, caving started. As undercutting was completed, production was held to a maximum of 1530 tons or an average vertical withdrawal of 1.7 ft a day after ten weeks of operation, the total expected dry tonnage of 191,000 being produced after a period of six months. Over-drawing of some finger raises caused a decrease in grade below that estimated. However, realizing the impossibility of determining the grade of this type of ore by inspection, a system of sampling the production was established and further dilution was reduced. Grizzly level repair costs in the sections of the block traversed by former gob filled stopes were somewhat excessive but little trouble from this source would have been experienced if such places had been filled completely with concentrator tailings, as planned for the future. Large boulders and timbers caused little difficulty, the usual method of blasting in the finger raises generally "freeing" them. The 500-ton concentrator section used at Anaconda for stockpile sample treatment was supplied with 40,847 tons of the total production from this first test block for further metallurgical tests, this material having been separated out at the Washoe Sampler where each day's production was sampled accurately.

The east edge of Test Block No. 1 having produced good grade material, Test Block No. 2 was started east of No. 1, with a pillar 10 ft wide between them. Instead of two haulage cross-cuts, only one located in the center of this block was used with slusher drifts on the first floor extending the full length of the block. The 600 sill data indicated waste (0.35 percent copper)

(Continued on page 39)

HIGHER COEFFICIENT OF PRODUCTION with WEMCO SAND PUMPS

Full-capacity operation with fewer shutdowns explain why WEMCO Sand Pumps outperform, outproduce pumps of less advanced design.



IMMEDIATE DELIVERY

WEMCO Sand Pumps and parts are available for immediate shipment from all WEMCO warehouses. For prompt service or price quotations, call the WEMCO office nearest you.

For handling pulps containing coarse sands, gritty solids, slimes, slurries, and heavy density media, WEMCO Sand Pumps provide high production at low cost. Available in sizes 2", 3", 4", 6" and 8" discharge diameter.

PRINCIPAL OFFICES

Los Angeles • Sacramento • Salt Lake City • Spokane
Pocatello, Idaho • Denver • Phoenix • Chicago
Hibbing, Minnesota • Bartow, Florida • New York

EXPORT DISTRIBUTORS

The Ore and Chemical Corporation
80 Broad Street • New York 4, N.Y.
Continental Europe and North Africa
Dr. Ing. Herbert Lickfett A/B, Stockholm 3, Sweden
Milieu Dense, Paris, France
Ferdinand Egeb erg & Company, Oslo, Norway
Macchine ed Impianti Ing. Donati & Co., Milan, Italy
A. Schubarth & Company, Basle, Switzerland
G. Matisinioti & Co., Athens, Greece
Agence Miniere & Maritime, S. A., Antwerp, Belgium
Adil Gobay & Albert Koenka, Istanbul, Turkey

The advanced design and simple construction of WEMCO Sand Pumps assure dependable, heavy duty operation with minimum interruption in service. Molded rubber or special alloy metal wearing parts, close tolerances, centrifugally sealed pumping compartment, heavy duty bearings, and specially designed open impellers combine to give superior performance under the most rugged conditions.



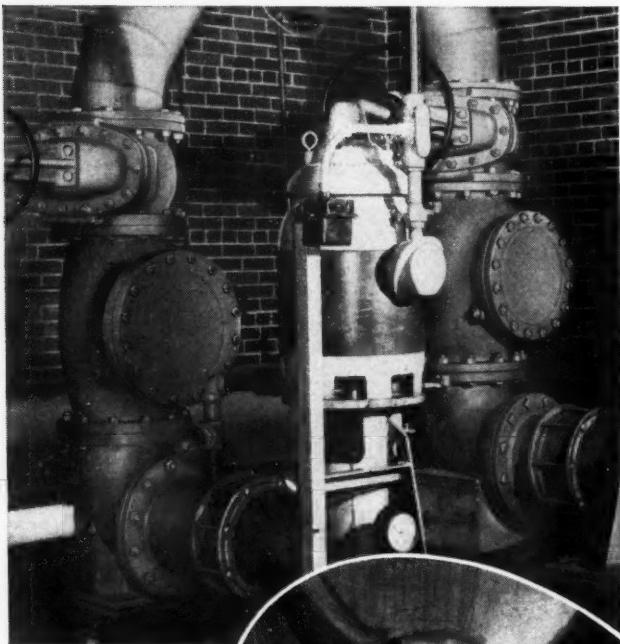
WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners
(HMS) Thickeners • (HMS) Media Pumps • Hydroseparators
(HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers
Sand Pumps • Conditioner and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

For complete selection in mine piping

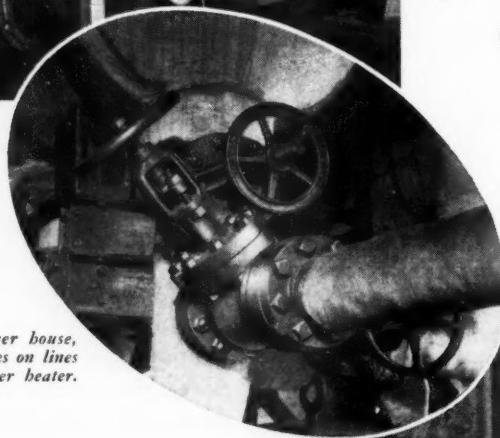
... "Get it from CRANE"

ONE

SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY



CRANE Iron Body Gate and Check Valves on mine pumping installation.



IN COPPER MINE power house, Crane Steel Gate Valves on lines to closed hot water heater.

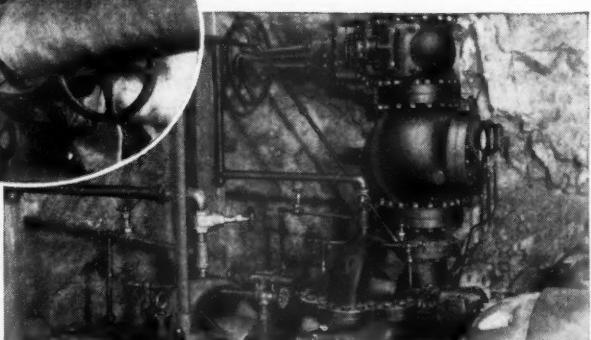
IN A SILVER MINE, Crane equipment includes 12-in. Ferrosteel Gate and Check Valves. Also brass, globes, angles and checks.

There is no easier, no more certain way to get the piping you need for power, process or general service mine installations. One order to Crane—through conveniently located Branches and Wholesalers—brings you the world's most complete selection of valves, fittings, pipe and accessories. One catalog gives you an unequalled choice of the best in brass, iron, steel and alloy materials.

Why not do as many leading mines have done and standardize on Crane? It is **One Source of Supply** broad enough to simplify all piping procedures, from design to erection to maintenance. **Undivided Responsibility** for materials helps you get better installations, avoids needless delays on the job. And for the **Highest Quality** in every item that makes for dependable piping performance—get it from Crane.

CRANE CO., 836 S. Michigan Ave.
Chicago 5, Ill.

Branches and Wholesalers
Serving All Industrial Areas



EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

FOR EVERY PIPING SYSTEM

PLUMBING
AND
HEATING



Surface plant of the Bessie mine, Sloss-Sheffield Steel and Iron Co.

Cleaning and Dewatering Fine Coal

**Kerosine Flotation Recovers Metallurgical Coal
Formerly Wasted as Sludge**

By GEORGE T. BATOR

Associate Professor of Mining
University of Alabama

IN THE coal producing industry the question of what to do about fine coal has been the \$64 question. This problem has confronted the producers for many years and the treatment of fines is still creating difficulties. Slurry waste going to the settling ponds and streams means a loss of valuable coal, reduced profits, and contamination which is illegal in many states and soon to become so in others. The enforcement of pollution laws creates a second problem and may bring about extensive experimentation which will uncover the solution to a difficult problem. Perhaps some variant means of mining can reduce the amount of fines and although mechanization has advanced rapidly with the development of ingenious machines, the fines are still coming from the working faces. It is true that savings have been made by eliminating labor but

in the Alabama coal fields mechanized mining has increased the ash content of mine-run coal, increased the volume of fines, and generally augmented the preparation engineers' worries.

Years of Experimentation

A few years ago the officials of the Sloss-Sheffield Steel & Iron Co. of Birmingham, particularly W. E. Hobson, became much concerned about the loss of fines. Metallurgical coke was much in demand and the Bessie mine produced a high quality coking coal from the Mary Lee Seam so the company proceeded to do something about the loss of sludge coal from the dewatering screens of the jig washery. In this instance the sludge was principally material of minus ten-mesh size which is not satisfactorily cleaned in jigs and although the flow sheet shows the dewatering screens as $\frac{1}{2}$

mm the actual size range is from ten mesh to zero.

Experimentation began in 1943 with the construction of a flotation cell to further the work being done by the Coal Division of the Bureau of Mines Southern Experiment Station on kerosine flotation of fines. The cell was installed at the Bessie Mine washery and experimental work was conducted in collaboration with the Bureau of Mines. Results from the home made device indicated that the process had excellent possibilities for recovering fine coal and warranted the purchase of a modified No. 24 Denver Sub-A two-cell unit to continue experimentation on a larger scale. Results with the two cells in series indicated that additional cells would be necessary. In May 1945, two more similar No. 24 Denver cells were added to the processing unit.

Extensive testing with the four cells in series was carried on with remarkably good results. An 18 percent ash sludge could be treated to give a 9 percent ash product and a refuse containing 50 percent ash. The four cells, however, could handle only a small portion of the washery sludge and in 1947 the Sloss Co. installed a unit large enough to process the entire sludge output. This method of recovery has proven to be most effective in diverting the sludge coal to be mixed with the coarse and converted into metallurgical coke.

Kerosine Flocculates Fines

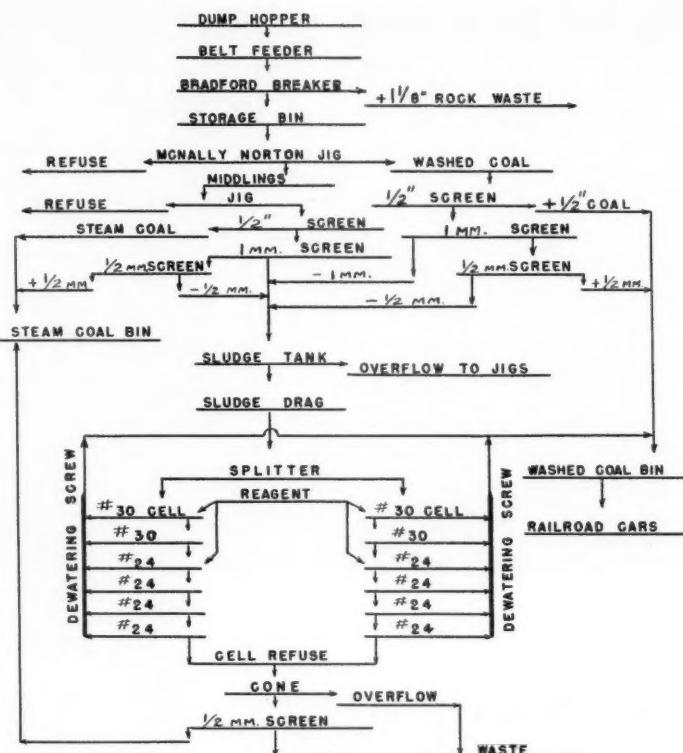
Kerosine has been used as a flotation reagent for many years in the froth flotation of ores and of coal although its inhibiting effects upon

froth formation generally rendered it usable only in small quantities; whereas, the present operation uses generous quantities of kerosine and no frothing reagent. In this process the kerosine reagent brings about flocculation of the fine coal which is simply a tendency for the particles to cohere and form flocs that rise to the pulp surface.

Froth flotation of coal has been carried on in other plants on a smaller scale but dewatering was always a major problem. Many elaborate means of dewatering have been developed to give an acceptable and salable form of fines but all are still too costly to use at this plant, so the character of the kerosine flotation product was instrumental in the development of a new process which is classified as dewatering by mechanical squeezing. This method described in detail in Bureau of Mines Report of Investigation 4306 not only dewateres but also acts as a conveyor and is readily attached to the cells to become an integral part of the process. As far as can be determined, the process at the Bessie Mine is the only known operation where the flotation and dewatering of coal fines is complete in the same unit.

Single Unit Floats and Dewateres Coal

At present the equipment consists of two batteries of cells with the washery sludge split equally to each series. Each row of cells in the plant consists of two No. 30 and four No. 24 modified Denver Sub-A cells in

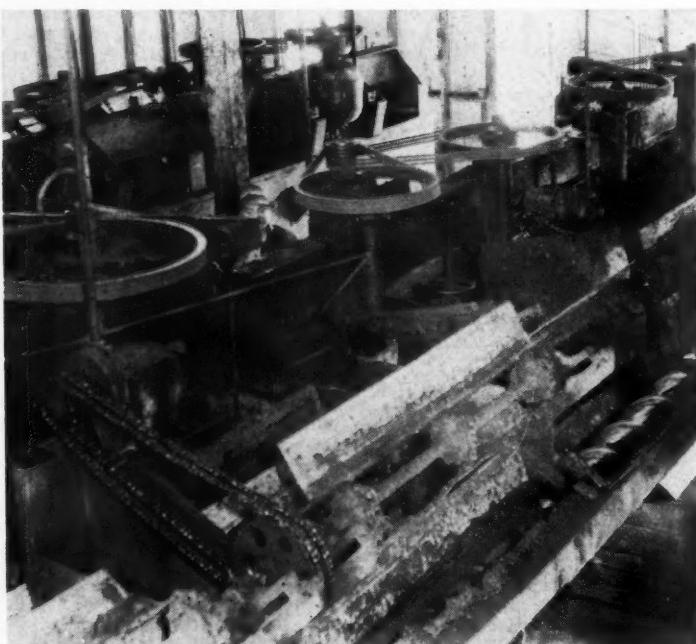


Flowsheet of Bessie mine washery and flotation plant

series with attached mechanical scrapers that discharge the float directly into the dewatering mechanism. Modifications of design of the Denver

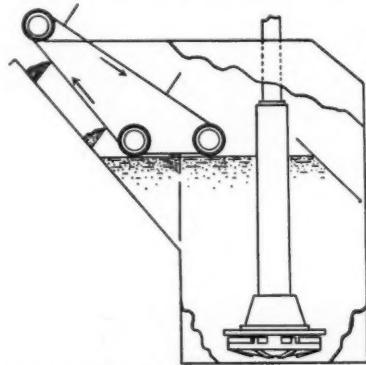
Sub-A cells were a result of the work done on this problem in order to permit removal of the flocculated material and at the same time give some dewatering previous to the squeezing operation. Kerosine flotation causes the flocs to accumulate as a partly submerged layer beneath the pulp level which requires removal by the present scraper arrangement. In effect, the scrapers give a horizontal swipe across the cell sweeping the submerged fines in front of them. These scrapers are 7 in. wide made of $\frac{1}{8}$ -in. aluminum metal plate perforated with $\frac{1}{4}$ -in. holes, giving approximately 40 percent opening. They are almost the width of the cell and attached to chains driven by a sprocket which revolves the sweeps at 4 rpm. A $\frac{1}{4}$ hp gear motor drives the scraper assemblies of a pair. Some slack is permitted in the chains to allow the scrapers to drag up the incline at a greater than normal right angle to the incline. The change in drag angle aids the free discharge of load at the lip of the cell.

As the load proceeds up the incline excess water drains back into the cell leaving an approximately 50 percent moisture content in the coal as it falls into the open trough dewatering mechanism which receives float coal from all six of the cells. Each unit of six cells is equipped with a sepa-



Kerosine flotation plant and dewatering auger in the Bessie preparation plant

rate trough fitted with a compression screw conveyor and casing developed to do the dewatering. A series of $\frac{1}{2}$ -mm opening, wedge-wire screen sections are welded into the bottom of the trough allowing the effluent to escape as the fines are conveyed to the discharge end of the assembly by the auger turning at about 45 rpm. At this point the auger extends into the casing which is welded to the trough and where the squeezing action takes place. The casing is fitted with sections of wedge-wire screen and extends about a foot beyond the end of the auger. The squeezing action is caused by a continuous accumulation of fines in the casing creating compression and in turn a continuous extrusion of a fairly compact core of fine coal. In the Bessie plant the extruded coal contains approximately 30 percent moisture although the process has produced 24 percent moisture content coal. During this dewatering action a small percentage of fine coal passes through the wedge-



Schematic section of cell showing drag assembly for removal of floated product. Perforated scraper dips into pulp.

wire screen sections with the effluent water but both are returned to the cell circuit and the coal refloated. There seems to be no tendency to build up a harmful circulating load of solids.

Refuse from both batteries of cells is discharged into a small dewatering cone where settling takes place. The cone underflow is pumped to a $\frac{1}{2}$ -mm opening shaking screen where the oversize particles are recovered going to secondary or steam coal and the undersize going to the refuse pond. Experience has shown ten-mesh to be about the maximum size that can be recovered efficiently, however a small percentage of oversize material gets into the flotation feed through worn places in the washery screens.

Cell feed is quite irregular and varies from practically nothing to momentary peaks of 45 tons per hour with an over-all average of about 20 tons per hour. It was thought that some arrangement would be necessary to smooth out the fluctuations of feed

JIG PLANT		October 1948	Jan. 1-Nov. 1, 1948
Ash in raw feed—average		30.98%	30.58%
Ash in washed slack—average		9.84%	10.31%
Ash in secondary coal—average		16.03%	15.44%
Loss in jig refuse—average		3.02%	3.15%
 FLOTATION PLANT			
Ash in raw sludge—average		20.12%	18.91%
Ash in washed fines—average		7.49%	7.93%
Ash in refuse oversize—average		26.22%	28.59%
Ash in final refuse—average		52.16%	57.81%
Kerosine per ton feed.		$\frac{3}{4}$ gal	

but the cells seem to have the property to absorb spasmodic surges without noticeable harm to the recovered fines, although a uniform rate of feed would probably increase cell capacity and decrease the reagent consumption.

Originally the reagent used was a mixture of kerosine and B23 frother in the proportion of one part B23 to 12 parts kerosine by volume. Tests have been made with the mixture and with kerosine alone but the slight advantage of using B23 has not justified its added cost and at present only kerosine is used. Nothing is done about pH control nor is there any conditioning of the feed prior to entering the cells. Kerosine reagent is fed into

the sludge as it enters the first cell and a small amount fed into the third cell. Most of the coal is recovered in the first two cells.

One major difficulty was encountered in the original full scale operation in that the reagent apparently attacked the natural rubber covered wearing parts of the cell, causing it to peel off. All original rubber covered parts have been replaced with cast iron or neoprene to eliminate this problem.

BIBLIOGRAPHY

B. W. Gandrud and H. L. Reiley, A Combination Cleaning and Dewatering Process for Treatment of Fine Sizes of Coal: Bureau of Mines RI 4306, July 1948.

Deeo Trefoil: September, October 1948.

Greater Butte Project

(Continued from page 34)

below this block, but the slusher level was in ore. Vertical raises were extended to the grizzly drifts 36 ft above the haulage level with conventional finger raises to the undercut at 18 ft above the grizzly, where each finger tapped 300 sq ft of undercut area. This block was designed to block cave an area 120 ft wide by 160 ft long with an extension 40 ft long by 30 ft wide along the south side of Block No. 1. As undercutting was completed, caving production was increased to a maximum of 1770 tons a day after one month, and finally was completed after a period of nine months, with a production including development of 304,187 dry tons, averaging 1.09 percent copper, 0.32 oz silver, and 0.002 oz gold a ton compared to an estimated tonnage of 303,500 averaging 1.07 percent copper and 0.32 oz silver. The copper content of the production from this block was checked by daily grab samples from finger raises, each sample of 25 lb representing 50 tons drawn. The results obtained were plotted on curves and, although individual assays were erratic in certain instances, the general trend served as a good indicator of the type of material from each point. As production exceeded the total expected tonnages from different raises accompanied by a drop in grade, drawing was stopped.

Following this procedure made the above described satisfactory production possible.

The block caving tests showed:

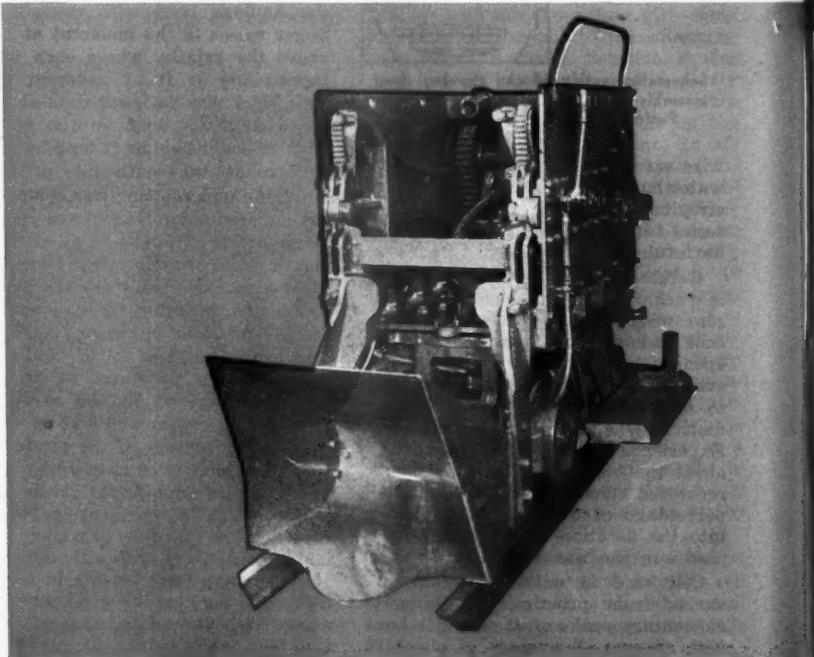
- (1) Butte ores of this type will cave readily and require little secondary breaking.
- (2) Prefilling will make development and maintenance much easier, thereby reducing costs.
- (3) Little or no boundary weakening will be required.
- (4) Small blocks with speedy development, undercutting, and drawing will reduce costs.
- (5) Draw point spacing with centers 20 by 15 ft appear best suited for Butte ground.
- (6) Grizzly spacing of 12 in., 36-in. chutes, and five-ton cars are about correct proportionately.

Therefore, with the completion of 20,848 ft of development having demonstrated the existence of 130,000,000 tons of block caving type ore containing a minimum of 20 lb of recoverable copper a ton, and test caving blocks having been operated successfully on a basis comparable with practice in other districts, the success of the Greater Butte Project is assured. Obviously, this new development together with the regular copper, zinc, and manganese ore production from the numerous veins of the district outside of the Project, means a long and prosperous operating period in the future at Butte.

**"One of the best pieces
of equipment on the job!"**

That's what users say about

JOY SHOVEL LOADERS



The JOY HL-20 Shovel Loader for large drifts. Can load up to 3 tons per minute using cars from 50 to 90 cu. feet capacity

*The JOY HL-3 Shovel Loader
for small drifts. Can load up
to 2 tons per minute.*



Note these Superior Features

**They mean Lower Maintenance—Faster Loading at
Less Cost—Greater Flexibility**

● automatic CENTERING DEVICE, an exclusive JOY feature. Quickly and easily adjusted to have centering take place at any point in the loading cycle. Makes loading under inclined walls easier, and gives a longer, straight throw back into the car.

● SUPERIOR CONSTRUCTION . . . truck frame, gear case, and bumper are all combined in one heavy alloy casting for perfect alignment of all parts.

● exclusive "PISTONAIR" MOTORS . . . give greater power for loading and trammimg, and provide better air economy.

● a LUBRICATION SYSTEM that is simple, yet provides ample lubrication for all moving parts.

● adjustable ROCKER-ARM LEVERAGE, another exclusive JOY feature. By changing position of lifting chains, the loader can load either long or short cars by changing discharge speed of bucket.

*Consult a
Joy Engineer*



WRITE FOR BULLETIN

W&O M2093

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

SAFETY—First! Last! Always!

LOCALLY DRAWN cartoons have done a lot to further safety at the Miami Copper Co., Miami, Ariz. The artist, Pancho Bautista, is an underground ore motorman. Being locally drawn, the cartoons have a much more direct appeal than the general run of printed safety cartoons. Most of them are self explanatory, illustrate a specific job, and show the safe and unsafe way to do it, generally showing the unhappy results when not done the safe way. This type of cartoon can also be used to illustrate a general picture, such as the electric blasting procedure. In use they are first dis-

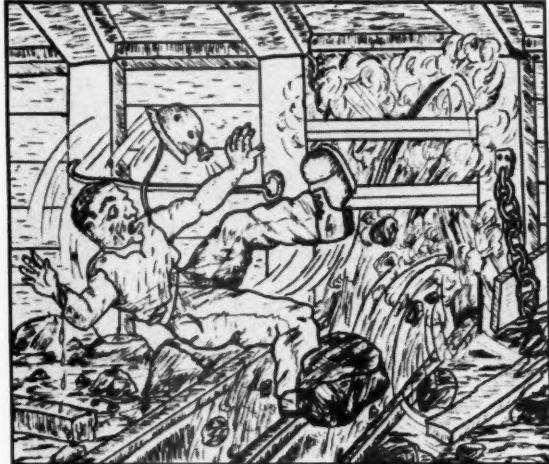
J. W. Still, Mine Superintendent, Miami Copper Co., Reports That Safety Cartoons Drawn by Local Miner Prove Effective

played on a bulletin board in the change room and then duplicates are posted in various places underground such as the lunch rooms, shaft stations, bosses' dog houses, etc. To make them easily reproducible they are drawn on tracing cloth and black and white prints made by the engineering office.

In addition to the cartoons, the underground safety first and accident prevention program at Miami is much the same as that in force at most of the large underground metal mines, where a continuing and persistent effort is made on the part of the management to keep accidents at a minimum.



DON'T stand on grizzly rails



DON'T use a D-bar or hook to poke down a raise



STAND in the clear and USE a long blasting stick when poking down a raise



This effort covers, first, the setting up of standard safe practice procedures to cover every individual underground job; and second, the placing of responsibility on the men's direct boss to see that this safe practice way of doing the job is followed thru.

Numerous supplemental and educational stunts are constantly used to sell both bosses and men on a 100 percent safety conscious attitude while on the job; the idea being to get it across in a way that will make the safety part of the job an auto-

matic reflex. The program includes a safety engineer, who is underground every day, warning notices signed by the foreman and superintendent and mailed (together with the man's prior accident record) to any man found working in an unsafe manner, yearly

first-aid classes for the bosses and old timers underground, bulletin board plugs of various descriptions, periodic accident description and statistical data furnished the bosses, intermittent safety meetings, and safety cartoons. The cartoons are prepared by the artist either on request or when an idea occurs that lends itself to presentation.

They are frequently changed and the men are always eager to see and study the latest safety effort of their fellow miner who produces the cartoons.



Miner

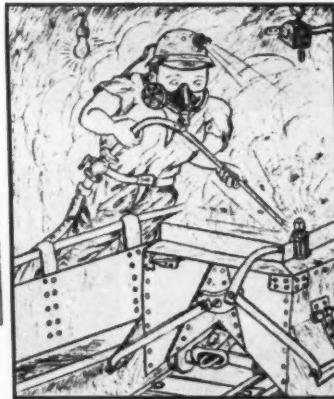


HE CAN SPARE

AN EYE—

CAN YOU?

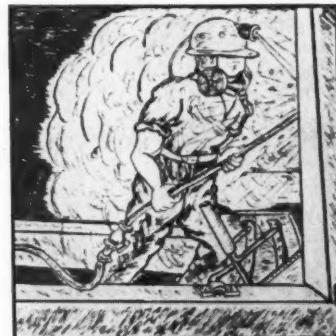
**USE YOUR
GOOGLES**



Pocketman



Trackman



Chutepuller



Mechanic



Pipeman



Tepper

ANOTHER SECURITYFLEX *Safety First:*

NON-DETERIORATING

GLASS CORD

REINFORCING



SECURITYFLEX *Safety First:*

- *First* to comply with U.S. Bureau of Mines Flame Test and Pennsylvania Flame Test. (Insist on mark of full compliance—P-102-BM—at 12' intervals.)
- *First* neoprene treated Glass Cord Reinforcing—stops wicking of moisture, conducting of stray currents, increases strength.
- *First* and *only* Anti-Short Breaker Strip* construction—cuts short circuits between conductors.
- *First* parallel mine cable with ground wire.
- *First* and *only* D-Shaped* insulation—prevents overriding of conductors.
- *First* to have insulation and outer jacket bonded to form a solid block around conductors.
- *First* with smaller diameters that pack more on a reel, ease handling.

*Reg. U. S. Pat. Off.

- Now Securityflex gives you—for the first time in a mine cable—*neoprene treated glass cord reinforcing*. This remarkable cord can't wick moisture and conduct stray currents... prevents rot and increases cable strength without sacrificing flexibility.

Consider the advantages of this new feature *plus*: famous Anti-Short Breaker Strip* (available with or without ground wire)... flame, abrasion and tear resistant neoprene outer jacket... exclusive construction that won't kink or twist... special heat resistant synthetic rubber insulation. There's no doubt about Securityflex's superiority.

For more tons per cable, specify Securityflex through Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y., or your nearest Anaconda Wire & Cable distributor.

40450

ANACONDA

Securityflex

MINE CABLE

ANACONDA
from mining equipment
REG. U. S. PAT. OFF.

Coal Show

Plans Completed

UNDER THE direction of L. Ebersole Gaines, National Chairman, Program Committee, an able and active group comprising representatives of all branches of coal mining has completed arrangements for the 1949 Coal Show, to be held at the Public Auditorium, Cleveland, May 9-12. Working together, the Program Committee has

weighed and considered numerous topics in scheduling a series of sessions to cover the broad scope of coal production, from the deep mining of anthracite to the strip mining of bituminous coal and the preparation problems involved in producing a specification product. Speakers on specific subjects, specialists in their



L. Ebersole Gaines
The New River Co.
National Chairman

Members—Program Committee

(Continued on pages 47 and 48)



R. L. Adams
Old Ben Coal Corp.



C. V. Beck
Clarence V. Beck & Co., Inc.



H. V. Brown
Brown-Fayro Co.



E. J. Burnell
Link-Belt Co.



T. C. Cheasley
Sinclair Coal Co.



H. J. Connolly
Pennsylvania Coal Co.



John P. Courtright
Marion Power Shovel Co.



S. J. Craighead
U. S. Fuel Co.



J. H. Fulford
Jeffrey Mfg. Co.



Wm. E. Goodman
Goodman Mfg. Co.



J. L. Hamilton
*Northern Coal Mines
Republic Steel Corp.*



E. H. Jenks
Hanna Coal Co.



A. S. Knoizen
Joy Mfg. Co.



Frank F. Kolbe
United Electric Coal Cos.



Stephen Krickovic
Eastern Gas & Fuel Associates

Preliminary Program

MONDAY—MAY 9

Morning—Open for Inspection and Study of Exhibits.

2:00 pm—Trackless Mining

Methods of Belt Conveyor Loading

A presentation by several members of the Coal Division Conveyor Committee showing various ways of loading main and gathering belts with shuttles, shakers and chain conveyors, and other devices

A. E. Long (Committee Chairman), Clearfield Bituminous Coal Corp.

A. B. Crichton, Jr., Johnstown Coal and Coke Co.

Robert Fletcher, J. H. Fletcher Co.

V. D. Hanson, Pittsburgh Coal Co.

C. W. Thompson, Weirton Coal Co.

Tractors and Trailers for Supply Haulage

To avoid belt reversing or supply track construction underground, rubber-tired units are used in trackless mining for handling supplies and man-trips from the outside to the working panels

G. O. Tarleton, Vice-President, Consolidation Coal Co. (Ky.)

A Symposium of Continuous Mining

A statement of the general problems encountered in continuous mining will be followed by descriptions of how the problems are being solved in actual operations with several different types of machines

Gerald von Stroh, Director of Development, BCR, Inc.

Other Speakers To Be Announced

2:00 pm—Maintenance and Ventilation

Maintenance of Underground Equipment

Describes the organization of the maintenance department of a modern mechanical mine, outlining the procedure in making inspections and repairs essential for operating at high production

W. F. Diamond, General Superintendent, Marianna Smokeless Coal Co.

Maintenance of Preparation Plant Equipment

An account of actual practices at a large modern installation, stressing the importance of continual inspection and maintenance of coal-cleaning equipment to promote better separation and lower operating costs

H. D. Bowker, Assistant General Manager, West Virginia Coal & Coke Co.

Auxiliary Ventilation

Methods of providing air to the active panels and working faces by means of auxiliary airshfts, blowers, and other types of equipment

R. G. Heers, Manager, Kaiser Co., Inc.,

TUESDAY—MAY 10

10:00 am—Utilization and Marketing

National Fuel Reserves for Future Fuel Supplies

How future coal production is apt to be affected by the development of synthetic fuels, underground gasification, and other research for fuel sources and by-products utilization

Arno C. Fieldner, Chief, Fuels & Explosives Division, U. S. Bureau of Mines

Trends in Consumer Demand

A discussion of what's ahead for coal, as indicated by an evaluation of present market trends and a forecast of future market demands for industrial and domestic fuel

George A. Lamb, Manager, Business Surveys, Pittsburgh Consolidation Coal Co.

Depreciation Allowances in Relation to Capital Required for New Patents and Equipment

An analytical presentation, stressing the importance of having special non-deductible depreciation reserves to provide funds for mining equipment replacements and plants modernization

T. H. Bierce, Assistant Treasurer, Rochester and Pittsburgh Coal Co.

2:15 P.M.—Face Operations

Cutting and Drilling With Tungsten-Carbide Bits

Technical data on operating results are presented and discussed to show how high speed in cutting and drilling is made possible through the use of hard alloys

Carl A. Burgener, Division Engineer, Peabody Coal Co.

Methods of Breaking Down Coal at the Face

Describing the use of three types of materials—Airdox, Cardox, and Permissible Explosives, explaining the seam and operating conditions best suited for each method

W. O. Smith, General Superintendent, Luzerne-Graham Mining Corp.

Use and Care of Trailing Cables

Based on studies made by the Coal Division Power Committee, this presentation will be made in two parts to bring out the factors involved in bringing power to face machines

C. C. Ballard, Mechanical Engineer, The New River Co.

E. W. Davis, Chief Electrical Engineer, Simplex Wire & Cable Co.

2:15 pm—Strip Mining

Recent Developments in Overburden Drilling

Describing methods and equipment when heavy overburden and varying rock strata introduce special problems

Howard Frisbie, Assistant Superintendent, Broken Aro Coal Co.

Blasting in Open-Pit Mining

A presentation in two parts, covering practices with two types of explosives used in different classes and depths of overburden

(a) With LOX—**Don McCloud**, Airmite-Midwest, Inc.

(b) With Fixed Explosives—**A. B. Austin**, Assistant District Manager, Hercules Powder Co.

Deep Stripping Methods

Operations in heavy cover use the latest models of conventional equipment, as well as some new types that have recently been brought into use

(a) Tower Excavator—**Harold Hicks**, Engineer, and **Howard Truax**, General Superintendent, Truax-Tracer Coal Co.

(b) Large Shovels—**Andrew Hyslop, Jr.**, Chief Engineer, and **Russell McHugh**, Engineer in Charge of Stripping, Hanna Coal Co.

Tuesday Evening—Coal Miners Party

WEDNESDAY—MAY 11

10:00 am—Surface Preparation

Dewatering and Drying Coal

A complete coverage of an important phase of coal preparation, including the range from raw coal to the finished product

(a) Methods and Equipment for Washed Coal—**Orville Lyons**, Battelle Memorial Institute

(b) Heat Drying Raw Slack—**J. C. Johnston**, Preparation Engineer, Eastern Gas & Fuel Associates

(c) Effect of Moisture on Surface Screening—**William R. Caler**, Preparation Engineer, Enos Coal Mining Co.

Dense Media Separation Process

A discussion of this newest development in coal preparation as illustrated in a plant recently installed in the Anthracite field.

Harrdon Randall, President, Rhoads Contracting Co., and **Edgar Schweitzer**, Fuel Engineer, Lehigh Valley Coal Co.

2:15 pm—Underground Haulage

Locomotive Dispatching by Telephone and Radio

The latest development for controlling trip movements underground is direct telephone and radio communication between the dispatcher and motorman

Frank Eubanks, Superintendent, Mechanical Maintenance, Old Ben Coal Corp.

Latest Developments in Belt Haulage

Describing some of the most recent improvements in belt construction, designed to produce more efficient transportation of coal, men, and supplies

Carel Robinson, Consulting Engineer, Robinson & Robinson

Shafts vs. Slopes for Hoisting

Recent installations of slopes and shafts offer comparisons between their costs of sinking, equipping and operating, as well as a comparison of the advantages of each type.

Paul Weir, President, Paul Weir Co.

2:15 pm—Strip Mining

Current Anthracite Stripping Practices

A coverage of modern developments, giving special attention to the application of heavy duty handling equipment and trucks in overburden removal.

Charles E. Brown, Mining Engineer, Philadelphia & Reading Coal & Iron Co.

Contour Mapping by Aerial Photography

Giving special reference to surveys for strip mining, including time and cost schedules, as well as explaining the accuracy and utility of the finished maps.

George Hess, Photogrammetric Engineer, Aero Service Corp.

Practices in Open-Pit Power Distribution

A presentation in two parts, giving the operator's and the manufacturer's viewpoints in relation to recommended practices for the operation of electrically driven equipment and the installation of the power distribution system.

John Huey, Electrical Engineer, United Electric Coal Cos.

David Stoetzel, Application Engineer, Mining Division, General Electric Co.

Stripped Land Regeneration

A report of progress being made in the studies, experiments, and

planning for reclaiming stripped areas for future beneficial uses.

A. G. Chapman, Chief, Central States Forest Experiment Station

2:15 pm—Steep Pitch Mining

A Round Table Discussion

Speakers, to be announced, will describe operations in Anthracite, Far West, and Canada.

THURSDAY—MAY 12

10:00 am—Management

Management-Employee Responsibility for Mine Safety

Stressing the importance of a willing cooperation between management and men, and illustrating how this cooperation brings about safer workings and a reduction in accidents.

Charles W. Connor, Manager, Mining Division, Armco Steel Corp.

Attracting Young Men to the Coal Industry

Presenting some suggestions to the industry as to what can and should be done toward bringing into coal mining young men who are potential future managers and executives.

Henry C. Woods, Chairman of the Board, Sahara Coal Co.

Improving Management-Employee Relations

Speaker to be announced.

AFTERNOON—Open for Inspection and Study of Exhibits

EVENING—ANNUAL BANQUET

Members—Program Committee →

(Continued from page 45)

respective fields, will present the most up-to-date data on modern practice, and discussion from the floor will add to the wealth of current information that the Coal Show will provide.

In recognition of the broad cross-section of the industry and the variety of interests which will be represented at the meeting, the Program Committee has planned the ten sessions to give appropriate coverage to the full range of coal mining activities. Beginning with a session on trackless mining, including a symposium on continuous mining, other special sessions have been planned to include maintenance and ventilation, face operations, underground haulage, strip mining, and steep pitch mining. Problems of general interest to all mining men—utilization and marketing, and surface preparation—will be covered by general sessions.

Preliminary information shows that the 1949 Coal Show will attract even greater attendance than the record-breaking meeting in 1947. In order to speed registration, a streamlined method has been devised which will eliminate the usual delays encountered. Notices are being sent to officials of coal companies advising them of the advance registration plan with a request to send in a list of their representatives who will attend. Each of these men will then receive by mail his "Coal Show Credentials"—consisting of a card which, upon presentation at the door, will admit the bearer without delay.

Likewise, individuals not covered by



Harry LaViers
South-East Coal Co.



Charles E. Lawall
C & O Railway



Carl Lee
Peabody Coal Co.



H. B. Lee
Maumee Collieries Co.



T. F. McCarthy
Clearfield Bituminous Coal Corp.



D. L. McElroy
Pittsburgh Consolidation Coal Co.



H. W. Meador
Stonega Coke & Coal Co.



C. R. Nailler
Pittsburgh Consolidation Coal Co.



J. T. Ryan, Jr.
Mine Safety Appliances Co.

Program Committee

(Continued from page 47)

(Photos not available)

E. F. Armington
Euclid Road Machinery Co.



W. H. Cooke
Little Sister Coal Corp.



George C. Holton
Explosives Department
American Cyanamid Co.



David Ingle, Jr.
Ingle Coal Co.



S. S. Lanier, Jr.
Norton Coal Mining Co.



R. C. Luther
Peerless Coal & Coke Co.



Leonard Sargent
Fairmont Machinery Co.

L. N. Thomas
Carbon Fuel Co.

W. A. Wirene
*Industrial Material Division
General Electric Co.*

T. R. Workman
*West Virginia Coal and
Coke Corp.*

R. H. Swallow
Ayrshire Collieries Corp.

such lists can submit their applications for advance registration to the Washington, D. C., office of the American Mining Congress and receive their Coal Show credentials. Send in your request now and you can eliminate time you would ordinarily spend in registering at Cleveland.

Following the practice adopted at the 1948 Convention, one-half hour movies of general interest will be shown in the meeting rooms in advance of each session. These films of the U. S. Bureau of Mines and the U. S. Army have been especially selected for their information value and interest to coal mining men. They serve an added purpose of bringing the audience into the meeting room ahead of time in order that the program may start on schedule.

This year the Exposition will outstrip all previous shows, with exhibits of 219 leading manufacturers featuring machines, auxiliary equipment, tools, and supply items for all types of coal mining. Two half-days—Monday morning and Thursday afternoon—have been left open without any scheduled meetings in order that visitors will have ample time to study displays. Over 90,000 net sq ft of floor space will be utilized in bringing to coal mine operators a review and preview of the developments produced by manufacturers that may be utilized for the more efficient and economic production of quality fuel.

Special entertainment has been planned to afford an opportunity for

relaxation and diversion as well as an occasion to meet old friends and make new ones. These functions will take place in the Arenas of the Public Auditorium which is amply large to accommodate the anticipated crowd. On Tuesday night, May 10, the Coal Miners Party will be a scene of fun and gaiety that will be long remembered. Skilled professional enter-

tainers will demonstrate their ability for the enjoyment of all.

The traditional Annual Banquet will be held on the evening of Thursday, May 12. Speeches will be held to the minimum at this informal affair in order to allow the fullest possible evening's pleasure, and a top notch floor show will be presented at this climaxing event of the Coal Show.



"Let me tell you about this stag they threw for us—understand—I've been to plenty of stags!"

—Colliers

"George said the convention was very dull this year. They used to have loads of fun"

DAVE GERARD

Automatic Pump Supplies Spray Water

Hanna Coal Co. Perfects Plan for Clarifying Mine Water

WATER SPRAYS on cutting machine bars have become the accepted method for taking coal dust from the mine air, at the working faces. For this purpose the water must be free from impurities that would clog the openings of the pipes and must also be supplied to the machines at a pressure that is fairly constant and high enough to form a spray at the nozzles. There are several different practices and types of installations in use in the coal mines of the United States, but in all methods the water supply is of first importance. Quite often the mine water is so contaminated with sludge and suspended matter as to be unfit for spray purposes and outside water must be piped into the mine.

Reservoir Clarifies Water

In eastern Ohio the Piney Fork Mine of Hanna Coal Co. was faced with this problem of water supply. The land over the mine is cut by numerous ravines and at places there is only 50 ft of strata overlying the coal seam, making it impracticable to impound large bodies of surface water. Consequently, it was necessary to devise some way to use the mine water. Through previous experiments, small sumps had not proven satisfactory because the great amount of sediment made the water muddy and eventually clogged the spraying mechanism. It was therefore felt that a large underground reservoir was needed where the sediment in the mine water would have a chance to settle

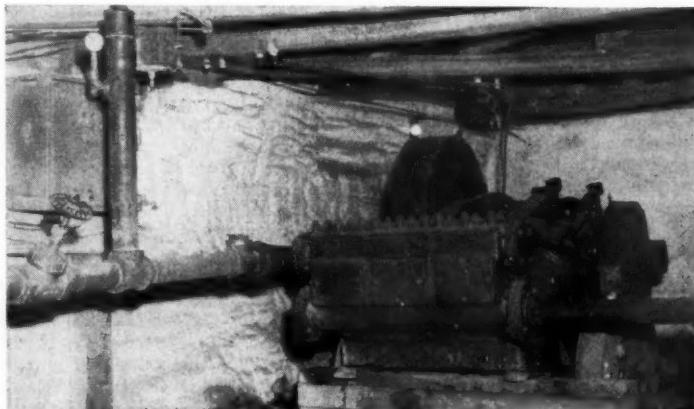
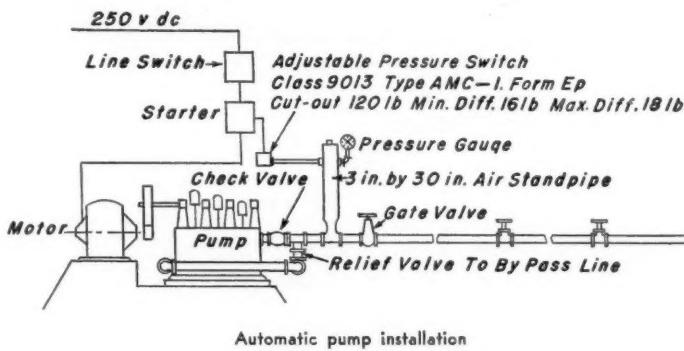
and clarify. This condition was met at the new Piney Fork Mine. The area was opened in October 1947 and, by the end of 1948, four main entries were driven approximately one mile. The coal was on the north side only but on the south side of the mains there were two locations where the coal could be mined out and the abandoned area used as a sump to receive mine water. This installation was made and has proven satisfactory—not only is the water clarified, but it is also neutral.

Water Distribution System

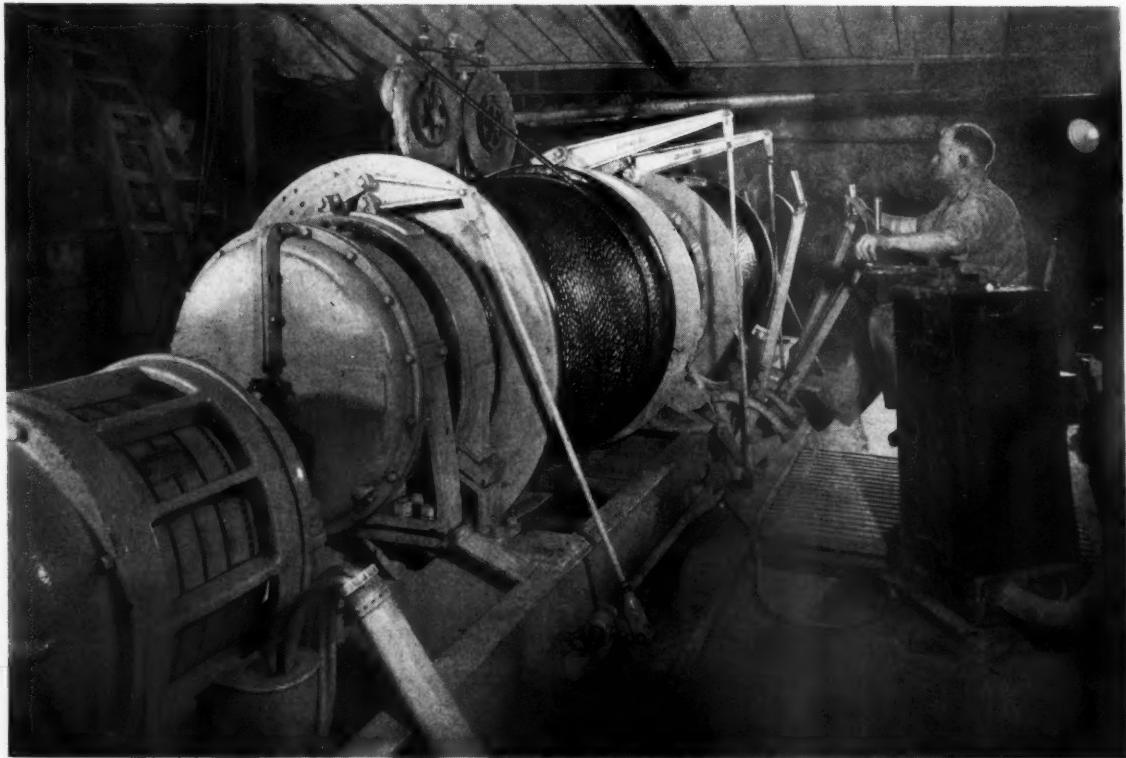
An adequate water supply having been provided, the next question was the method of delivering this water to the working faces. After conducting an extensive survey covering various types of installations the company decided that water cars would be most satisfactory and that a capacity of 750 gals per car would be the proper size. This capacity was selected as it would eliminate filling during the working shift. The tank cars were made at the company shops.

A piping system, installed from the underground reservoir to the working panels, has now reached a total length of 7000 ft of 2-in. line. This is laid along each panel entry as far as the first room; at each terminal point there is a valve and a 10 ft flexible hose where the water cars are filled. A tank car at this point can be filled in about five minutes; this is done by the cutting machine man and his helpers who bring the machine and water car to the filling point, place the hose in the top of the tank car and open the valve. The pressure in the pipeline is carried at a maximum of 40 lb and a minimum of 20 lb. When a valve is opened anywhere on the line, the pressure drops to 20 lb; this starts the automatic pump which runs until the valve is closed again or until the pressure reaches 40 lb. The pump which supplies this is a 5½ by 8-in. Deming pump, a three-plunger type, controlled by a Westinghouse automatic starter. The installation is shown in the accompanying sketch and is also illustrated in the photograph.

In the previous method, at Piney Fork, with small capacity sumps, four pumps were needed. Now the one pump tends to the needs of eight sections. Formerly it took half an hour to fill the water car, but now only five minutes. Water is pumped into each section and is about the best fire-fighting protection the mine could have. Also the stream of water, running onto the cutter bar, being clean, is much larger than before, thereby greatly decreasing the dust problem. The pump is based on the same idea used in residential water systems; pressure valve automatically turns the pump on when the pressure gets below a certain point.



Reducing Shaft Sinking Costs



Main hoist at Mayflower shaft has hoisted over 500,000 tons of ore and waste

Boskovich Mucking Machine Eliminates Hand Mucking and Doubles Clean-Up Speed

By CLARK L. WILSON
Superintendent
New Park Mining Co.

IN PRINCIPLE the Boskovich mucker is a power shovel dipper suspended below a mine cage that provides room for the operator and air hoists that power the unit. Two air hoists provide power to swing the dipper through a muck pile by means of cables strung over sheave wheels mounted at the ends of the shaft section. Crowding action of the dipper is provided by an air piston mounted on a horizontal bar suspended below the cage. To efficiently clean the bottom the bucket is moved horizontally across the short dimension of the shaft by a third air hoist and necessary cables. A fourth air hoist controls the vertical position of the machine and cage and permits the mucker to be hoisted in a shaft compartment during blasting.

Use of the machine doubled the speed of mucking shaft rounds, shortened the time required to timber and eliminated the need for staging in drilling station openings. Elimination

of hand mucking had a favorable psychological affect on the crew as well as saving physical effort for other phases of the shaft sinking cycle. The machine was constructed to operate inside timber, and when used this way, reduced the hazard of falling slabs resulting from too much open ground. The time involved in placing the machine in mucking position was negligible.

A comparison of performance records before and after installation of the machine indicated an over-all increase from 0.16 to 0.28 of a foot advance per manshift worked. Buckets mucked per manshift increased 70 percent. Manshifts required to install one shaft set decreased 23 percent.

Sinking Practice

The Mayflower mine of the New Park Mining Co. is in the southern part of the Park City Mining District, 30 miles southeast of Salt Lake City. The Mayflower tunnel was

driven to intersect the Park-Galena fissure at the 800 level of the Park-Galena mine. The fissure was found at a point 6600 ft from the tunnel portal and has been mined below the tunnel level through the Mayflower shaft. The collar of this interior shaft is 7200 ft from the tunnel portal at the 800 level of the Mayflower tunnel.

The Park-Galena fissure strikes east-west and dips 80 deg north through unaltered diorite porphyry. Jointing in the diorite sometimes produces large blocks causing overbreak in mine openings. The shaft is in the footwall and 45 ft south of the fissure on the 800 level. The rock in this area will generally allow the shaft to be open 15 to 25 ft below timber.

Shaft sinking originally began in December 1941, and proceeded as new levels were needed. The last sinking operation was started July 16, 1947, 671 ft below the collar and was completed June 30, 1948, 1060 ft below the collar.

Sinking was initiated from the 1380, or lowest level from the shaft. The shaft bottom was 91 ft below this level when operations began and plans called for additional depth sufficient for three 125-ft levels with a skip pocket and sump room below the last, or 1755 level.

The Mayflower shaft has three compartments with an average outside section of 9 by 19 ft. The two hoist compartments are 4½ by 5½ ft. An auxiliary cage, pump column, and power lines are in a third compartment having a crosssection of 5 by 5½ ft. The auxiliary cage operates to the 1270 level. The compartment was bulkheaded at this point to be used for the sinking operation from the 1380 level.

A Sullivan, single drum, friction clutch, 60-hp hoist was installed on the 1380 level, 37 ft from the face of the shaft, opposite the sinking compartment. A fleeting sheave wheel was used at the back of this station and a standard sheave installed in the compartment 100 ft above the station level. The sinking cage was built in the mine shop with a 20-ft extension crosshead. Sinking buckets of 21-cu ft capacity were suspended below the cage from two ½-in. cables attached to the cage crosshead. Buckets were dumped at the 1380 level and muck entered the main shaft pocket to be hoisted to the 800 level. Buckets were dumped by means of a dump door swung into the sinking compartment. Two trunions welded to the bucket bottom engaged supports welded to the door, and buckets were automatically dumped by the hoistman.

Sinking operations developed no new water, but approximately 20 gpm came into the shaft from upper levels and skip pockets. No. 35, IR sponge pumps relayed water from the bottom to wooden sump boxes on intermediate station levels. A series of 15-hp, 2 RVH, IR pumps carried the water to the main station pump on the 1380 level. The sinking compartment contained a 4-in. air line, 2-in. water line, and a 3-in. pump line.

Shaft rounds were drilled with Thor Cochise Model 72 wet sinkers using 1½-in. round lug steel. Casing bits of 2¼-in. diam were followed by 1½ in. starters and successive ½ in. changes. A round generally consisted of 36 holes using a "V" center cut. The depth of the round varied from 5 to 6 ft depending on ground conditions. Ten sticks of 60 percent semigelatin powder per hole were necessary to produce satisfactory rock fragmentation. Shaft rounds were blasted electrically using 15 delays.

Shaft sets were framed from 8 by 8 in. Oregon fir pressure treated with creosote. Sets were tied with ¾-in. hanging rods and Coeur d'Alene lagging was used throughout.

The sinking crew consisted of a shaft foreman, eight miners, two of whom were "lead men" for the two-shift operation, two hoistmen, one mechanic, and two part time pump men. A grizzly tender was also assigned part time to the shaft.

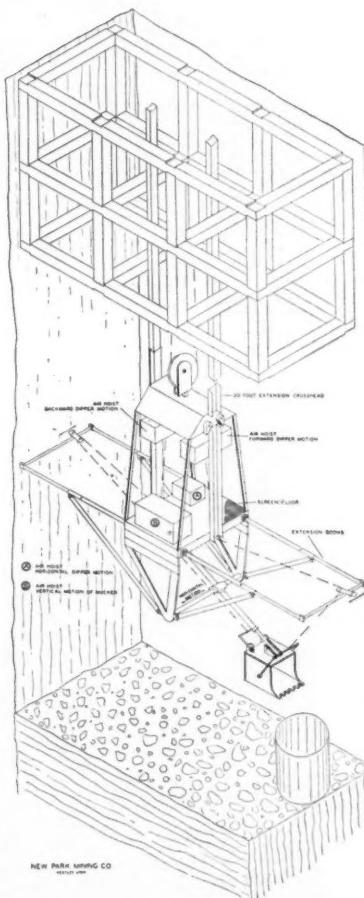
The shaft operated on two shifts that coincided with those in the mine. The mine production was hoisted through the main shaft and at times

actual work in the shaft bottom were also limited as transportation in and out the tunnel, time for lowering and hoisting men, lunch time, and "taking five" were all deducted from the eight hour portal-to-portal shift.

Also included in the sinking operation was the excavation of 11,000 cu ft of rock at stations and skip pocket openings. This work is not included in the shaft cost analysis.

One of Utah's important producers, the New Park Mining Co., Keetley, Utah, recently completed sinking operations in the main shaft of the Mayflower mine. On this project an unusual machine, the Boskovich mucker, proved its economic value as an important addition to modern mining equipment.

unavoidably hampered progress in sinking. A shaft round could be blasted only at the end of a shift as fumes passed through the mine workings. This occasionally caused delay in the cycle of work. The hours of



Boskovich shaft mucking machine used in sinking Mayflower shaft

Milan N. Boskovich of Midvale, Utah, supervised the sinking as shaft foreman and contracted to provide mine labor at a flat fee per foot of shaft advance. The New Park Mining Co. provided all material and supplies and also service labor including hoistman, mechanic, pumpmen, and grizzly tender. Mr. Boskovich had previously contracted Mayflower shaft sinking and was interested in using a mechanical shaft mucking machine of his own design. This machine was built by the New Park Mining Co. at the shops of the Mayflower mine.

Boskovich Mucker Speeds Sinking

A cage for the mucking machine was built for the center shaft compartment 4½ by 5½ ft in section. Shaft guides 4 by 6 in. reduced the section to 3 ft 10 in. by 5½ ft. Floor dimensions of the cage were 44 by 60 in. and clearance was 82 in. between the deck and the safety crosshead mechanism. The deck was covered with 1-in. mesh screen to enable the operator to observe the shaft bottom. A 58 in. length of 3½-in. shafting was suspended 51 in. below the cage deck at right ankles to the long dimension of the shaft by means of two "A" frames keyed to the bottom. This "A" frame could be adjusted in its horizontal position beneath the cage for mucking at various positions in the shaft bottom, but was never moved in mucking the Mayflower shaft.

A 7 in. section of 5 in. diam steel shafting was drilled and bushed to slide on the 3½-in. shafting. A standard leyner machine clamp was welded to the 7-in. shafting and was used to attach a 6-ft air piston adapted from a Coeur d'Alene Hardware Co. air bar. The piston bar was machined to 2 in. diam and air connections were added to allow piston action in both directions.



Mucker operator watches bucket through wire mesh floor

A 5½-cu ft bucket was pinned to the end of the piston to form the dipper for digging. The pin extended through the piston rod and a bracket welded to the bucket. A series of holes drilled in the bracket provided several angles of digging for the dipper. This bucket was a 21-in. cube with the bottom side extended to 28 in. to provide digging teeth. A dump door was hinged from the back of the bucket and locked with a spring latch. The latch was tripped by the operator with a spring latch. The latch was tripped by the operator to dump the contents of the bucket. The door automatically closed as the bucket was returned to digging position. The air piston provided crowding action as the bucket was pulled through the muck pile.

Two HU, IR single-drum air hoists were mounted 5 ft above the cage deck adjacent to the cage guides. The ½-in. cable from the hoists was carried vertically down to the bottom of the cage around an 8-in. roller 2 in. in diameter and extended horizontally to opposite ends of the shaft section. The cable then passed through a traveling sheave and down to bridles pivoted on the mucker bucket. These cables provided the digging and return action of the mucking machine dipper.

Sheaves located at opposite ends of the shaft were supported from a pipe framework or booms pinned to the mucker cage. Four 3-in. pipes 4 ft long were extended horizontally from each corner of the cage in the direction of the long dimension of the

shaft. A 2½-in. pipe was inserted inside the 3-in. pipe and the length of each pair was made adjustable by holes drilled through both pipes to accommodate a 1-in. bolt. A 2-in. shafting was welded between opposite pairs of the 2½-in. pipe and formed a track for the traveling sheaves referred to above. This pipe framework was supported in a horizontal position by additional pipes angled down to the bottom of the "A" frame. Safety pins at all connections enabled this framework to be quickly dropped below the cage when the mucker was hoisted.

A man seated on the cage operated the dipper back and forth through the muck pile using lever controls from the two HU hoists and provided crowding action with a foot-operated valve that controlled the piston.



Crowding the muck pile with the 5½-cu ft dipper



Loading the 21-cu ft bucket. Note jointing responsible for overbreak

It was found necessary to provide motion of the dipper across the short dimension of the shaft to insure a clean mucking job and to speed mucking by placing buckets on alternate sides of the shaft bottom. As noted before, the piston was mounted to slide transversally on a shaft and the traveling sheaves at the shaft extremities had similar motion. An EE9G, IR air motor was equipped with a four compartment drum built from 6-in. pipe. Cables from this hoist extended through sheaves to either side of the dipper mechanism and traveling sheaves, and allowed the mucker operator to adjust the dipper at any desired position under the cage.

A KK5D motor mounted on an IR HU frame was attached to the deck of the mucker cage to provide independent hoisting of the mucking machine. A $\frac{1}{2}$ -in. cable from the hoist drum was carried over a 2-ft sheave wheel mounted 50 ft to 150 ft above the cage in the mucking compartment. The cable passed through a second sheave wheel fastened to the cage king bolt and was fastened below the top sheave. A three part line was necessary as the horsepower of the hoist was not sufficient to take the direct load of the mucker.

A 20-ft extension crosshead built from 3-in. angle iron allowed the machine to muck below timber and gave some stability to minimize side sway during mucking operations.

The mucker was operated inside timber when ground conditions made this necessary by telescoping the pipe supports for the traveling sheaves and leaving dividers out of the sets.

The four-man sinking crew included a mucking machine operator, two men to level the muck pile and spot buckets, and a fourth man to push the sides of the muck pile into the bottom and operate the sponge pump. Only one or two buckets had to be hand mucked per round.

Loading time per bucket varied with the rock fragmentation. Four or five scoops of fine rock would fill a 21-cu ft bucket in one minute. A cycle of loading, hoisting 375 ft, dumping and return averaged four minutes.

An excellent platform that could be quickly adjusted to any vertical position for placing shaft timber or to act as a drilling platform in cutting stations and skip pocket openings was made by covering the horizontal pipe supports with 3-in. lagging.

The machine could operate with several feet of water over the muck pile, but it was the practice to keep water pumped out at all times.

U. S. Patent No. 2,426,591 and No. 2,435,669 have been issued to M. N. Boskovich and Arthur O. Hall covering the operating principle and also a proposal that the air piston be used as a drilling column for operating leyner machines.

TABLE I

	August 1947 Hand Mucked	February 1948 Machine Mucked	Total Shaft
Footage	ft	ft	ft
Manshifts drilling	27	54	389
Manshifts timbering	34	50	462
Manshifts mucking	30	32	300
Total manshifts	98	106	892
Advance per manshift	162	188	1,654
Holes drilled	0.16	0.28	0.21
Buckets mucked	214	422	2,979
Sets timbered	706	1,277	9,250
Holes per manshift	5	7	75
Buckets per manshift	6.3	8.9	6.45
Sets per manshift	7	12	10.3
Time worked in shaft (389 ft sunk)	0.17	0.22	0.22
Average progress per eight hour shift	—	—	0.86 ft
Advance per round (83 rounds)	—	—	4.66 ft

Cost Analysis Favors Muckers

The wage rates per eight-hour shift in effect at the time of sinking were as follows:

Lead shaftman	\$11.89
Shaftman	10.89
Hoistman	10.64
Pumpman	10.14
Mechanic	9.89
Grizzly tender	9.49

There was also a 6¢ per hour differential for night shift.

The shaft crew of eight men were guaranteed a base wage of \$15 per shift and were paid a contract bonus based on ft of advance per manshift worked. The base wage plus bonus averaged \$20.36 per shift for the entire sinking operations.

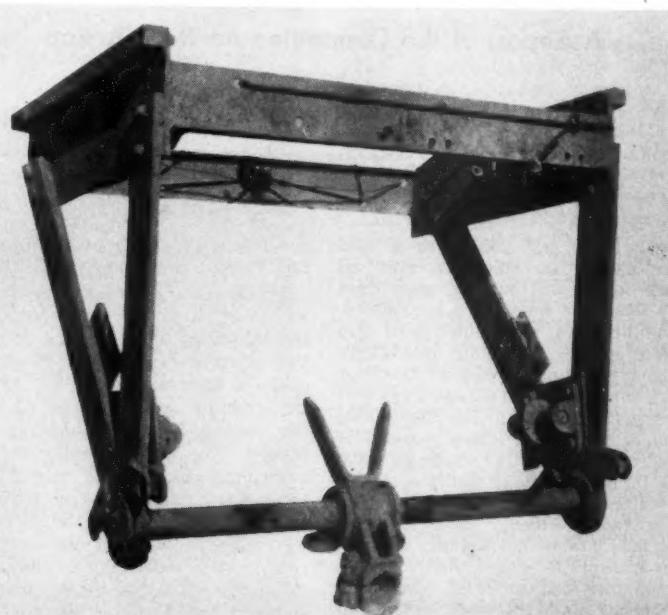
Material costs for the mucking machine, including steel, piston, cables, and air hose totaled \$965.23. The labor cost was \$934.26.

Since the shaft sinking was a part

of the mine operation, some of the electrical, mechanical, and maintenance costs were absorbed by the mine. Direct costs per ft were as follows:

	Labor	Supplies
Drilling and blasting	\$15.01	\$5.69
Timbering	9.68	25.84
Mucking	29.02	5.01
Hoisting	16.88	0.44
Night shift premium	1.06	—
Bonus	41.82	—
Surcharge	7.87	—
Pumping and mechanical	7.20	1.27
Miscellaneous	—	7.36
Total	\$128.54	\$45.61

During August 1947, the shaft was hand mucked, and during February 1948, it was machine mucked. These two months were selected for performance comparisons and results are shown in Table I above.



"A" frame suspended below cage. The piston clamp on supporting mechanism slides on the horizontal shaft



Crack in ground resulting from pillar extraction

Surface Factors Affecting Pillar Recovery

A Report of the Committee on Roof Action

By H. P. GREENWALD

Superintendent
Central Experiment Station
U. S. Bureau of Mines
Pittsburgh, Pa.

RECOVERY OF pillars in a coal mine means automatically that all strata above will subside more than they would if no pillars are mined. If pillars are not mined and are strong enough to stand indefinitely without crushing, caving of the roof into rooms or other passage ways will be superficial insofar as the whole thickness of strata above the coal is concerned, unless the workings have only light cover (say 50 ft or less), in which case local disturbances of the surface are likely. However, once the percentage extraction becomes high enough to cause the remnants of the coal bed to crush (and any systematic and thorough extraction of pillars will take it that high),

subsidence of all the overlying strata and surface is inevitable.

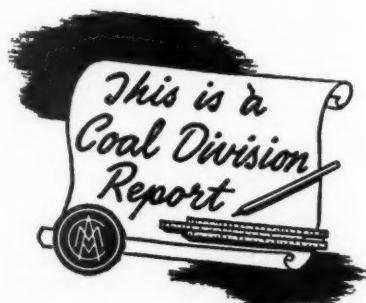
What extra costs or loss of value should be looked for as a result of this subsidence? Will the value of the extra coal recovered offset these costs if they occur? This phase of the problem should be studied before the final decision is made to remove pillars. The study should be thorough and impartial, so that the management may avoid on the one hand rushing into unjustifiable expense and on the other accepting specious arguments put forth against changes in mining method merely to cover resistance to change. Human disinclination to leave old and familiar methods for a journey into the new

and untried cannot be discounted in this matter. Neither is a fear of excessive cost sufficient ground for avoiding the problem, which must be studied carefully to determine what the cost will be.

This article attempts merely to list the obvious outside factors that should be considered in any scheme for withdrawing pillars. Many operators will find that most of them do not appear in their particular case. Nevertheless, it is wise to think the problem through regardless of whether the conditions look favorable or unfavorable at first glance.

It must be recognized that anything written here can be general and along qualitative lines only. Each case must

Photos and charts by U. S. Bureau of Mines.



be analyzed separately and judged on its own merits. The main things to look for are effect on:

- (1) Mining of beds below
- (2) Mining of beds above
- (3) Disturbances produced on the surface

Effect on Mining Lower Beds

What effect will pulling pillars have on mining a lower bed later? Obviously the effect will decrease as the thickness of intervening strata increases. Structural engineers have a great deal of data on the spread of forces beneath a footing. A pillar places a concentrated load on the strata immediately beneath it, and the desirability of having pillars in a lower bed immediately beneath those in an upper bed is well-known for beds having only small separation. However, if the pillars in the upper bed have been drawn and the whole mass above has subsided, loading goes back a long way toward the conditions that existed before any mining, and greater freedom in laying out the lower workings results.

The matter becomes especially important when barrier pillars must be maintained either to separate different mines or to act as dams impounding water. The barrier-pillar question has been nowhere more active in the United States than in the Pennsylvania anthracite region. S. H. Ash and W. L. Eaton discussed the question at length in a paper entitled "Barrier Pillars in the Anthracite Region of Pennsylvania," presented before a meeting of the Coal Division of the AIME. This paper (TP 2289) appeared in the November 1947 issue of *Coal Technology* and will be included in the 1948 Coal Division vol-

Extraction of pillars in coal mines entails estimations of costs and effects on other property which should be examined prior to adopting a plan for high recovery. Consideration should be given to the effect on coal beds above and below that in which pillars are to be extracted and to effects upon the surface that will result from the inevitable subsidence. These matters are developed in some detail with citation of examples.

ume. Further discussion of the paper was printed in *Coal Technology* for November 1948. The authors show what has been done to comply with a Pennsylvania State law requiring the presence of barrier pillars; evidently, there are still differences of opinion as to what should be done. Inrush of impounded water is a particular danger in the cases considered in that paper.

It becomes obvious that the method of mining adopted in an upper bed can seriously restrict what can be accomplished in a lower bed when the interval between them is not large. If the pillars are mined in the upper bed, the load on the roof of the lower bed will be distributed more evenly and the open volume in which water can collect will be reduced.

Effect on Mining Higher Beds

When one considers other beds above the one being mined, conditions are different. If one of these beds is commercially valuable or will be in the foreseeable future, it should be preserved. If the interval between the two beds is small, it is practically impossible to pull the pillars in the lower bed without causing serious dis-

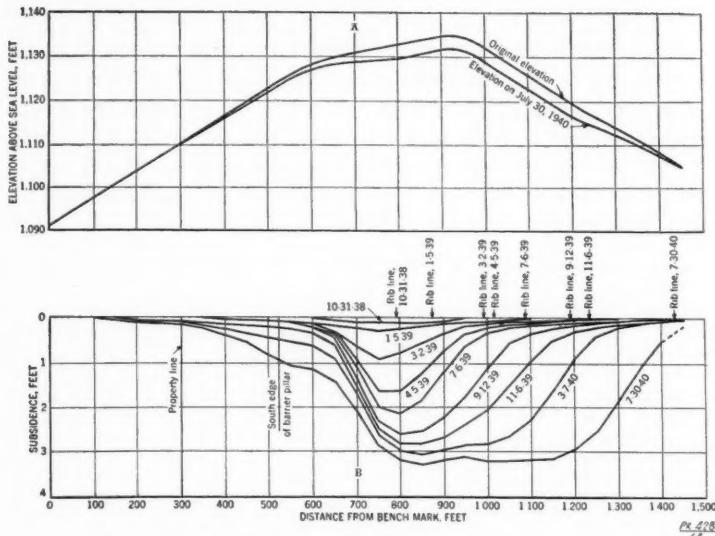
turbance in the upper, which may make mining it difficult, if not impossible. When the interval becomes considerably larger, it is possible to pull the pillars without great disturbance to the upper beds, but here the methods used become crucial. The pillar lines must be long, nothing must be left that can give support and cause uneven subsidence, and the rate of movement of the pillar line must be fairly uniform and continuous. It is true, of course, that in some cases of this kind the roof over the upper bed may be affected adversely; in other words, it may be less firm than it would have been had there been no subsidence, but this depends on the nature of the strata and must be assessed for each individual case.

Again the anthracite region furnishes examples which are further complicated by heavy pitches of the beds being mixed. A paper entitled "Mining Anthracite on Pitching and Flat Seams Over Mined-out Areas," by W. H. Moore and E. T. Powell, appears beginning on page 16 of volume 149 (Coal Division, 1942) of the Transactions of the AIME. Interval between the mined-out and active workings was as low as 55 ft. Subsidence had caused deterioration of roof. In some instances the bed to be mined had separated from the roof, and in others there was separation at a parting within the bed itself. The paper shows how these difficulties were overcome and a high percentage extraction obtained in the upper bed.

In 1923, Howard Eavenson prepared for the AIME a paper entitled "Mining an Upper Bituminous Seam after a Lower Seam Has Been Extracted," which appeared in volume 69 of AIME Transactions, pages 398-405. Mr. Eavenson cited examples from Pennsylvania, Maryland, the Pocahontas field, Scotland, and Natal. Mining of the upper seam was successful in some cases and not in others. In four mines in Central Pennsylvania a bed was being worked 80 ft above another (4 ft thick) that had been mined and at least partly robbed. No great difficulties were encountered. In another case an attempt to mine a bed 25 ft above another that had been worked had to be abandoned. In still another case, with an interval of 119 ft, the weak immediate roof of the upper bed had been sufficiently dis-



Effect of roof weight in an entry, showing cracking and spalling of ribs



Subsidence of a highway caused by pillar mining.

turbed to require more than normal timbering.

Mr. Eavenson reported some good results in mining the Redstone bed in southern Somerset County, Pa., 19 to 35 ft above the Pittsburgh bed, which had been mined previously. To quote: "The experience in that district is that any two seams with this thickness of strata between them can be mined successfully, if the lower seam has been entirely removed before mining the upper one; —". Note the "if"; irregular extraction in the lower bed would result in an entirely different story. Careful reading of this paper is recommended to those who have direct interest in the matter.

In almost no instance will the present-day operator find that his predecessors gave thought to the effect of their operations on beds below or above. He will have to accept the conditions as he finds them and apply the best engineering at his command to the facts as they stand. Unfortunately, also, he is likely to find that records of previous operations are more scanty than he could wish.

Disturbances Produced on the Surface

There is a long record of studies of the effect of mining on the surface above, concerning many minerals besides coal. In 1937 George S. Rice prepared a review covering the preceding 15 years, which appeared in volume 139 (Coal Division, 1940) of the Transactions of the AIME pages 140-154. Surface features that may be damaged by subsidence can be classified into:

- (1) Water; in streams, reservoirs, or wells
- (2) Transportation; railroads, highways, pipe lines, pole lines,

observed that, in some cases, the loss of water in a well is not permanent. The water returns (possibly many months later) as the underground courses opened by the subsidence clog and close.

A main-line railroad right-of-way cannot be disturbed; a siding might be if the users can afford to wait while the track is jacked back to grade and new fill added after a subsidence. The allowable effect on highways varies widely. Dirt roads hardly need be considered unless potholes form. At the other extreme are high-speed multiple-lane highways, in whose surface breaks and unevenness can be quite dangerous. The Pennsylvania Turnpike has been affected by subsidence at one point near its western end, and a driver hitting



A school building damaged by subsidence resulting from extraction of pillars. Cost of repairs was estimated at \$20,000.



A main roof break in the Pittsburgh Sandstone, 30 or 40 ft above the coal bed

this spot at 60 to 70 mph feels that his car may be getting out of control.

Much can be found in the literature on the effect of subsidence on railroads and highways. As an example, H. N. Eavenson made a voluminous report on the matter in 1926, which appeared in the Transactions of the AIME volume 74, 1926, pages 734-809. Report of Investigations 3562 of the Bureau of Mines, issued in March 1941, gives data on subsidence of a secondary road in Pennsylvania caused by pillar withdrawal beneath. Both Pennsylvania and West Virginia have laws on the matter with which operators in those States should be familiar.

Pole lines are reasonably flexible structures and will stand considerable deformation of grade without rupture. However, when one comes to the steel towers used to carry high-voltage transmission lines, it is necessary to watch for deformation within the structure of a single tower that might weaken it. Pipe lines are also flexible to deformations of long radius but are likely to shear off if subsidence causes a sudden break in grade. Conduits are rigid and will stand little deformation without cracking or rupturing.

Oil and gas wells have been included here because they are channels for the vertical transportation of

these fluids. The dangers attending rupture of such a channel in a mine do not need elaboration. It is the first duty of a mine operator working in the vicinity of gas and oil wells to know what is required in the matter by the law of his state. These laws are based in general on the idea that an active well must remain undisturbed by anything that can happen during mining. This is accomplished by leaving a pillar of solid coal around the well. Differences of opinion can be found as to what constitutes an adequate pillar, but in this matter the law usually leaves little to the decision of the operator unless he wants to leave more coal than the minimum required. Different rules are sometimes provided for inactive wells if these have been properly plugged. Another difficulty is that records of old drillings are not always trustworthy. The writer knows of a case in which an owner got information on four old abandoned wells by talking to people who had lived in the vicinity up to 50 years. There was no written record of these wells, yet individuals could show the exact spots at which they had been drilled.

Damage to an inhabited building always attracts particular attention because of the human element involved. The records contain many studies, some conducted with great care and in much detail. Actual dam-

age may vary all the way from minor matters, such as cracking of plaster and sticking of doors, to complete destruction of a building. The method and continuity of pillar extraction are particularly important in this matter, and the thickness and nature of the strata between the coal bed and the surface have a great deal of influence. One particularly complete study was reported in 1933 by F. W. Newhall and L. N. Plein in a paper entitled "Subsidence at Merritstown Air Shaft Near Brownsville, Pa." which appeared in volume 119 (Coal Division, 1936) of the Transactions of the AIME, pages 58-94.

Finally, for this article, but practically first for the operator are legal considerations. What can he do under the terms of his leases or deeds of purchase? What responsibility do those documents place upon him? What laws of his State affect his operations and require him to consider the effect thereof on others, regardless of the terms of his ownership? What is the trend of court decisions in such matters? Should he forego some of his legal rights in the interest of improving his public relations and avoiding legal actions and sales resistance that can spring from public resentment? When one considers mining under a community, these last questions are far from academic.

Mine Safety Research

Mine Safety Appliances Co., Pittsburgh, Pa., has announced that a modern research laboratory, the largest in the world devoted exclusively to the development of safety equipment for mines, will be constructed in Pittsburgh with completion scheduled for September 1949.

Facilities of the laboratory will be made available to all industries for the investigation of safety equipment problems affecting health and property. Activities of scientists will be coordinated with those of the U. S. Bureau of Mines, U. S. Public Health Service, Industrial Hygiene Foundation of Mellon Institute, Harvard School of Public Health, the new school of Public Health of the University of Pittsburgh, and fellowships of other leading universities.

In the announcement made by George H. Deike, president of the company, it was stated that the building will be dedicated to John T. Ryan, who, with Mr. Deike, founded the company some 35 years ago. It will be known as the John T. Ryan Memorial Laboratory.

Included in the great variety of equipment and instruments will be a high altitude chamber. Dust, fume, and gas chambers for research on masks and protective respirators, and a wind

tunnel to improve instruments for measuring air velocities.

Electrical research in the laboratory will further improvement of mine lighting equipment, including the Edison electric cap lamp.

In the chemical section, researchers will continue to develop chemicals to remove toxic and noxious fumes and gases from the atmosphere in mines and industrial plants. The rubber and plastics laboratory will study mate-

rials for manufacturing face masks, safety hats and helmets, safety clothing, and other types of equipment.

The company's quality control laboratories and engineering department will be located in the new building. This organization headed by George H. Deike, Jr., engineers and designs for manufacture and sale the equipment originated in the laboratory. Dr. William P. Yant, director of research and development for the company since 1936, will have charge of the research laboratory.



Architect's sketch of John T. Ryan Memorial Laboratory



WHEELS OF GOVERNMENT

As Viewed by A. W. DICKINSON of the American Mining Congress

MOVEMENT of bills on the Senate floor is currently blocked by the Southern filibuster to hold off the Administration drive for "civil rights" legislation. The Administration scored on its Marshall Plan, however, when the Senate Committee on Foreign Relations on March 7 voted unanimously to report the ECA bill.

Chairman O'Mahoney's (Dem., Wyo.) Joint Committee on the Economic Report has also endorsed the "Fair Deal" program to the extent of advocating standby authority to regulate wages, prices, and distribution of scarce materials; extension of rent control; a farm price support program; credit controls; housing proposals, and expansion of social security coverage and increased benefits. The White House request for authority to construct industrial plants deemed necessary to overcome shortages did not receive the Joint Committee's endorsement. Minority members of the Committee brought in strongly dissenting reports, that of Senator Taft (Rep., Ohio) in particular charging that proposals contained in the program "could bring about a completely regimented people."

Trade Agreements

The House-approved measure extending the Reciprocal Trade Agreements authority to June 12, 1951 has been subjected to extended hearings before the Senate Committee on Finance, and a determined effort is anticipated on the Senate floor to require the setting of "peril points" to protect American industry from foreign competition. W. Lunsford Long, vice-president, Tungsten Mining Corp. asked the Finance Committee to adopt the amendment submitted by Senator Bailey of North Carolina in 1945, excluding strategic and critical materials from further duty cuts under the Act.

Endorsing the Bailey amendment,

Secretary Julian D. Conover of the American Mining Congress also recommended establishment of a policy under which the statutory rates of duty upon such materials be restored at the earliest possible date. He warned that our domestic mining industries must have adequate tariffs to protect them against the competition of lower labor rates and richer deposits in foreign countries. He told the Committee that the failure of Congress to adopt the Bailey amendment four years ago has contributed to existing shortages of metals and to the critical situation in which some of these industries now find themselves.

Meanwhile, the Finance Committee has reported to the Senate the Mills (Dem., Ark.) bill suspending the import tax on copper until March 31, 1951. Representative Mills also has a bill pending before the House Committee on Ways and Means to extend the suspension of the duty on lead for one year beyond June 30, 1949. Also before the Ways and Means Committee is the Van Zandt (Rep., Pa.) bill to suspend the duty on zinc for two years.

Taft-Hartley Act

After extending hearings on the Administration's labor bill through February 23, the Senate Committee on Labor and Public Welfare on March 4 reported the measure to the Senate without change. Protesting that needed amendments should have been placed in the bill while it was in Committee, minority members led by Senator Taft of Ohio will drive for amendments on the Senate floor, including retention of the non-Communist affidavit, the employer's right of free speech, the requirement that collective bargaining be carried on in good faith, and that the Conciliation and Mediation Service be continued as an independent agency. Additional amendments which will be in-



Washington Highlights

CONGRESS: Delayed by Senate filibuster.

TRADE AGREEMENTS: Bill in Finance Committee.

TAFT-HARTLEY ACT: Senate floor battle pending.

WAGE-HOUR: House Labor Committee divided.

SOCIAL SECURITY: Many weeks of hearings scheduled.

BASING POINT: Moratorium in prospect.

STOCKPILING: Appropriation approved.

MINE INCENTIVES: Committee puzzled.

GOLD: Urge free market.



sisted upon are the exclusion of supervisors from the definition of employees; the designation as an unfair labor practice of coercion, violence and mass picketing; responsibility of unions for the acts of their agents; and provision for restraining orders against unfair labor practices.

Testifying on February 19, President Howard I. Young of the American Mining Congress drove home arguments for the retention of the non-Communist affidavit, and other provisions of the Taft-Hartley Act which are of vital importance to sound industrial relations. Under skillful examination by Senators Taft, Donnell (Rep., Mo.) and others, Mr. Young and numerous other witnesses made a strong case for substantial amendment of the Administration bill.

It will probably be mid-May or later before Congress disposes of this highly controversial measure.

Wage-Hour

Amendment of the Wage-Hour Act has been a hard fought issue in the House Committee on Education and

Labor. Struggling with a marked division in his Committee, Chairman Lesinski (Dem., Mich.) is expected to bring out a bill setting a minimum wage at around 60¢ with an escalator clause relating to the index of the Bureau of Labor Statistics. The bill may broaden the coverage of the law and possibly define "regular rate of pay."

On the overtime-on-overtime issue the House has passed a bill intended to relieve employers in the longshore, stevedoring, building, and construction industries. This measure is now the subject of hearings before the Senate Committee on Labor and Public Welfare, with industry representatives urging that it be made to apply retroactively to all industries. A further amendment is being urged which would provide a clear definition of "regular rate of pay."

Social Security

Hearings expected to last for many weeks are now going on before the House Committee on Ways and Means on two bills which would carry out the President's social security program. Greater aid to State public assistance funds would be provided by one bill, which provides Federal participation in payments made under a State welfare plan to any needy individual (not limited to the aged, the blind, and dependent children as under current law). Included is a substantial medical relief program; a grading of the percentage of cost that the Federal Government would pay in any State in accordance with the income of the State; and denial to the States of the imposition of any residence requirements to make persons eligible for aid.

Another bill extends and liberalizes old age and survivors' insurance benefits and provides Federal cash benefits for permanent and temporary disability. The extended coverage would include farmers and farm laborers, domestics, non-profit institutions, self-employed professionals, Federal employees, service personnel, and State and local government workers. The bill would repeal the Gearhart resolution of last year which requires that the common-law definition of "employee" shall govern under the Social Security Act. This pointedly affects the situation with regard to mine leasers.

Under this bill payroll taxes would rise from 1 to 1½ percent each on employers and employees on July 1, 1949, and to 2 percent on January 1, 1950—2½ percent for the self-employed. Instead of applying to income up to \$3,000 it would apply up to \$4,800. The taxes levied by the bill are intended to cover the cost of benefits for the next 5 to 10 years, and thereafter the rates would have

to be raised or the Treasury would have to supplement the trust fund from general revenue, or both.

Basing Point

Current activity on basing point legislation has been transferred to the Senate Judiciary Committee from the Committee on Interstate and Foreign Commerce. The House Judiciary Committee on March 1 approved the bill by Representative Walter (Dem., Pa.) which would bar antitrust suits against freight absorption until July 1, 1950, pending an exhaustive Congressional study of legislation to clarify the confusion resulting from Supreme Court decisions and FTC rulings on basing point pricing systems. The bill would not apply to cases pending in Federal courts as of March 1, 1949, nor to cases which involve conspiracy charges.

This bill is expected to pass the House at an early date and to be the subject of quick action by the Senate Judiciary Committee.

Stockpiling

The House Appropriations Committee has reported the Treasury-Post Office supply bill in which is included \$525,000,000 for stockpiling of strategic and critical materials for fiscal 1950. The Munitions Board is also authorized to contract for an additional \$250,000,000 during the year. Of the \$525,000,000, \$250,000,000 is for payment for materials already contracted and the remaining \$275,000,000 is for new purchases.

The Appropriations Committee states that the "stockpiling program has been moving forward at a satisfactory pace and good progress has been made in building up our reserves of strategic and critical materials."

Mine Incentive Bills

Further hearings on bills to establish incentive payments for mineral production and exploration are scheduled for March 9, 10, and 11, at which representatives of the manganese industry and Government agencies are expected to appear. Meanwhile, as the result of hearings held thus far on his own and other bills, Chairman Clair Engle (Dem., Calif.), of the House Public Lands Mines and Mining subcommittee, states that his Committee is puzzled. Engle explained that a number of mineral producers desire a law with a built-in mandatory incentive price system. Again, stated Engle, "The Department of Interior wants a new law which will permit selective contracts with miners. The miners think the Department's proposal would lead to favoritism... The Department thinks the miner's plan is impossible to ad-

minister." Engle is concerned over the possibility of a veto of his bill and states that, "so far we have not arrived at an answer to the dilemma."

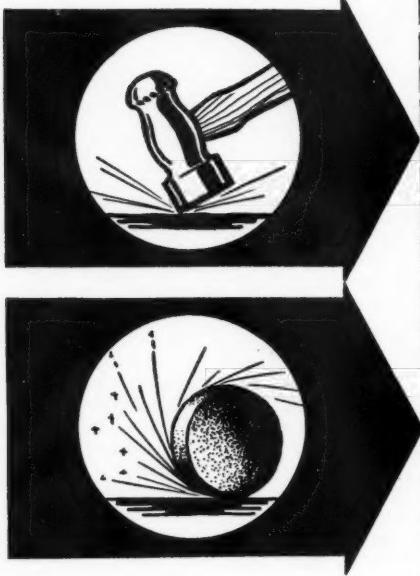
At hearings before Engle's subcommittee on February 16, Donald F. Carpenter, Munitions Board chairman, stated that mine incentive payment legislation is unnecessary to meet the requirements of the stockpiling program. Appearing in support of mine incentive payments legislation were Representative Mansfield (Dem., Mont.); Allen L. Hearst, secretary, Northeastern Mining Association; A. E. Peterman, Calumet & Hecla Consolidated Copper Corp.; Carl Wilken, Raw Materials National Council; J. Reid Denison, Walter H. Denison Manganese Co.; E. R. Shorey, National Minerals Conservation Council; James E. Quigley, Small Mine Operators, Leasers, and Prospectors Association (Eureka, Utah); O. W. Bilharz, Bilharz Mining Co.; C. E. Stover, Tri-State Zinc & Lead Ore Producers Association; James H. Buchanan, Nellie B. Mining Co.; Frank Eichelberger, mining engineer; Jesse L. Maury, mining engineer; and Robert S. Palmer, secretary, Colorado Mining Association.

Gold

In mid-February the International Monetary Fund approved a sale in London of 100,000 troy ounces of 22-carat gold by the South African Government at a premium price of \$38.20 an ounce. The approval carried the proviso that the gold was to be used only for industrial or professional purposes. However, on February 27 the directors of the Fund declared that they were not satisfied with the safeguards provided to assure that the gold will be used only for industrial, professional, and artistic purposes. They reiterated their position that the Fund will adhere to the \$35 an ounce gold price established by the U. S. Government and approved by the Fund. They decried the statement of the South African Finance Minister: "It has become increasingly clear that the elaborate attempt to keep up behind tremendous facades of exchange controls the fiction that gold is worth only \$35 an ounce, cannot endure much longer. This is an international problem and will soon be the touchstone of the success or failure of the International Monetary Fund."

Meanwhile, Joseph Stagg Lawrence, Consultant to the American Mining Congress' Gold Producers Committee, has come out strongly for the McCarran-Engle bill which would permit the sale of newly-mined or imported gold in an unrestricted market. Lawrence stresses the importance to the public interest of an or-

(Continued on page 71)



IMPACT

ABRASION

COSTLY WEAR FACTORS IN MILLING COUNTERED BY AMSCO[®] ALLOY STEELS

AMSCO STANDARD MANGANESE STEEL

"The toughest steel known" resists abrasion well under severe impact. Here's a service comparison of liners in a Colorado gold mine.

MATERIAL	TONNAGE GROUNDED
Heat treated alloy steel	87,838
AMSCO standard manganese steel	131,729

AMSCO SPECIAL MANGANESE STEEL

For greater wear resistance than standard manganese steel . . . and to withstand shocks equally well.

Material	Service	Tonnage Ground
Standard manganese steel	6 mo.	17,256
AMSCO special manganese steel	10 mo.	24,618

AMSCO CHROMIUM-MOLYBDENUM STEEL

Where impact resistance is secondary to extreme abrasion resistance, use Amsco uniform analysis "chrome-moly."

Material	Cost per Ton Milled
Standard manganese steel	.007405
AMSCO chromium-molybdenum steel	.006839

In your grinding mill two powerful forces of wear are always there . . . impact and abrasion. The extent to which each of these forces is present depends on a number of factors that vary with every mine. Among these factors are: type and condition of ore, size and speed of mill, size and total load of balls or rods, and design of liner.

It is in the correct weighing of all these factors that our experience added to yours can be of tremendous service. As a result of Brake Shoe research and development, we can recommend the particular alloy to use for all of the internal castings of your mill . . . to give optimum resistance to impact or abrasion (according to grinding conditions) and thereby greater tonnage before replacement is necessary. Amsco now offers mill parts such as liners, grates, and feeder lips in a range of alloy steels to meet most combinations of impact and abrasion. The case histories on liners listed here show typical results when Amsco recommended steels are used.

All uses for Amsco castings in mines and quarries are described in Bulletin 743M

AMERICAN

Brake Shoe

COMPANY

AMERICAN MANGANESE STEEL DIVISION

CHICAGO HEIGHTS, ILL.

Foundries at Chicago Heights, Ill., New Castle, Del., Denver, Colo., Oakland, Calif., Los Angeles, Calif., St. Louis, Mo.
Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.



Personals

Harvey S. Mudd has been appointed a member of the National Minerals Advisory Council.

Charles A. Owen, president, Imperial Coal Corp., has announced the following elections by the board of that corporation: **George E. Owen**, vice-president, and **Harry B. Bartley**, assistant to the president.

Professor Harold L. Walker, head of the department of mining and metallurgy at the University of Illinois, has been appointed by Governor Adlai Stevenson to serve as acting director of the Illinois State Department of Mines and Minerals. He fills the vacancy occasioned by the sudden death of James W. Starks.

Dr. John F. Thompson, executive vice-president of the International Nickel Co. of Canada, Ltd., since 1936 and a director and member of the executive committee since 1931, has become president. **Robert C. Stanley**, president since 1922, director since 1917, and chairman and president since 1937, continues as chairman of the board. **Dr. Paul D. Merica**, vice-president since 1936 and a director, has become executive vice-president. **Henry S. Wingate**, secretary since 1939 and a director, has become a vice-president and continues as secretary.

Roland M. Richmond, formerly mine foreman at the Tungsten Mining Corp., Henderson, N. C., has been promoted to the position of mine superintendent.

M. C. Wallgren, former governor of Washington State, has been appointed chairman of the National Security Resources Board. President Truman stated that he has considered Mr. Wallgren for this post for some time because of his stockpiling experience gained while serving on a U. S. Senate Committee charged with accumulation of strategic materials.

F. Earle Snarr, superintendent of the Orient No. 1 mine of the Chicago, Wilmington & Franklin Coal Co., Orient, Ill., has been appointed assistant to the general superintendent, John Rodenbush. **Howard Schultz** succeeds Mr. Snarr at Orient Mine.

Duane S. Myers, mining engineer, has been appointed superintendent of the Iron Mountain mine, Mo. The mine is operated by the Ozark Ore Co., a subsidiary of the M. A. Hanna Co.

A. L. Jordan has joined the Appalachian Coal Institute engineering staff.

Robert Weir, Springfield, Ill., has joined the Nokomis Coal Co., Nokomis, Ill., as assistant night superintendent.



S. M. CASSIDY, president, Consolidation Coal Co. (Ky.), was appointed Chairman of the Coal Division by the Board of Directors of the American Mining Congress at their Annual Meeting in Washington, D. C., January 26, 1949. Mr. Cassidy is highly qualified by wide experience for this position; he has operated mines in several states, is one of the pioneers in coal mechanization, and is a past Chairman of the Committee on Mechanical Loading. His leadership assures that the Committee reports on mining practices will maintain their present high standards, and that the Division will continue to render the greatest possible service to the coal industry.

Mr. Cassidy succeeds Harry M. Moses, President, The H. C. Frick Coke Co., who held the chairmanship of the Division for the past seven years and who was elected to the Board of Directors of the American Mining Congress at the Annual Meeting on January 26.

Newly appointed members of the Advisory Council are: C. J. Potter, president, Rochester & Pittsburgh Coal Co.; T. F. McCarthy, vice-president, Clearfield Bituminous Coal Corp.; and G. R. Jennings, general superintendent, Olga Coal Co.

Uncas Peacock, for eight years executive secretary-manager of the Louisville Coal Institute, resigned effective February 15 to accept a position as Louisville sales representative of the Kentucky Cumberland Coal Co., Knoxville, Tenn.

H. E. Treichler has been named vice-president and general manager of Texas Gulf Sulphur Co.

Mr. Treichler has been associated with Texas Gulf for 30 years and has served as general manager of the company since 1930. Mr. Treichler will continue his headquarters at Newgulf, Wharton County, Texas, site of the company's Boling Dome deposit.



Ernest H. Rose, of the Tennessee, Coal, Iron and Railroad Co., Birmingham, Ala., has been appointed to the Atomic Energy Commission Advisory Committee on raw materials.

A. G. Kirkland has been appointed assistant manager of western mines of United States Smelting Refining and Mining Co., effective January 1, 1949.

B. E. Grant, general superintendent of U. S. and Lark Mine since 1944, was appointed assistant to manager of western mines. **Max M. DuBois**, superintendent of Lark Section since 1945, succeeds Mr. Grant as general superintendent of U. S. and Lark Mine. **Benton Boyd**, formerly assistant superintendent of Lark Section, became superintendent of Lark Section. **Harold H. Wells**, formerly general mine foreman, U. S. Section, was appointed assistant superintendent of Lark Section. **Neil Fresh**, formerly assistant general mine foreman, U. S. Section, was appointed general mine foreman, U. S. Section. **Robert Weagel**, formerly shift foreman, U. S. Section, was appointed assistant general mine foreman, U. S. Section. These appointments became effective February 1, 1949.

W. C. Atkins, formerly general night foreman, Mine No. 15, West Virginia Coal and Coke Corp., Stirrat, W. Va., was recently promoted to superintendent of the company's Micco No. 3 Mine. **Rex Lawson** succeeded Mr. Atkins as general night foreman at No. 15 Mine. **Ed Bays** is the general mine foreman.

Hogarth Penprase, now mining captain at the Iroquois mine of Calumet & Hecla Consolidated Copper Corp. is being transferred to the Seneca mine, in the same position. John Lasio who has been demonstrating the Liddicoat bits at different mines of the company, will become mining captain at the Iroquois mine upon completion of this assignment. Colin Campbell was recently appointed assistant to the mining manager, O. A. Rockwell.

Dr. Phillip L. Merritt, formerly of Duluth, Minn., is now assistant manager, raw-materials operations, U. S. Atomic Energy Commission.

Carl A. Marshall has been appointed director of the Fairmont Coal Bureau with offices in New York City, according to an announcement made by A. C. Spurr, chairman of the bureau's management committee. Mr. Marshall relieves Earl C. Payne, who has served as acting director of the bureau since the resignation of Julian E. Tobey in the fall of 1948.

Fehl J. Shirley has been named assistant manager of the Titanium Division of National Lead Co., with headquarters at St. Louis.

William J. Johnson of DuQuoin, Ill., was appointed assistant director of the state department of mines and minerals by Governor Adlai Stevenson.

D. D. Wilcox, who has been general superintendent of the Superior Coal Co., Gillespie, Ill., for more than 45 years, has retired because of ill health. He was succeeded by Lawrence Kiss. Mr. Kiss has been succeeded by Robert McKee in the post of superintendent and Stewart Pratt, mine manager, Mine No. 3, is now assistant superintendent. John McDonald has been named mine manager at the No. 3 mine.

At the annual meeting of stockholders of the Illinois Zinc Co. the following were elected directors: D. C. Bakewell, Lawrence R. Berkey, Thomas H. Blodgett, Ashbel Green, James A. Hill, Seton Porter, Charles J. Stewart, Max Sherover, and Jacob Kromberg.

Frank E. Cash, formerly supervising engineer for the U. S. Bureau of Mines in Duluth, Minn., is now at the College Park, Md., office of the Bureau.

John Howe has been named superintendent of operations of the Johnstown Coal & Coke Co., Johnstown, Pa., at its Portage, Pa., operations. Ted Orr has been named superintendent of the Beaverdale, Pa., operations of the company.

Dr. A. Paul Thompson was recently appointed director of research of the Eagle-Picher Co. He fills the position left vacant by the death of Earle W. McMullen.



William G. Hogue has been named to succeed Carl Trischka as chief geologist for the Copper Queen Branch, Phelps Dodge Corp., Bisbee. Mr. Trischka is retiring after 28 years of service with Phelps Dodge.

Alex J. Colquhoun has been appointed superintendent of the Peabody Coal Co. in the Taylorville-Springfield district, Springfield, Ill. Lynn Trovillion was appointed assistant superintendent of the district.

Fred J. Brough, owner of the Pope-Shannon mine, was elected director of the Central Idaho Mining Association for Lemhi County.

M. W. Reed has been appointed vice-president of engineering of United Steel Corp. of Delaware to succeed B. H. Lawrence who is retiring after 44 years of service.

—Obituaries—

Charles O'Neill, 61, for many years the spokesman for operators in the bituminous coal industry died at New Rochelle, N. Y. on February 27. He was president of the United Eastern Coal Sales Corp., and the Central Pennsylvania Coal Producers Association.

For many years Mr. O'Neill had been prominent in representing the operators in wage negotiations with the United Mine Workers.

In 1933 he was active in Washington, D. C., for the Eastern Bituminous Coal Association when his activity in negotiations with UMW resulted in reestablishment of collective bargaining in the coal industry under the terms of the Appalachian agreement. During World War II he was a member of the Solid Fuels Advisory War Council and chairman of the National Bituminous Coal Producers Advisory Committee. He was a member of the board of directors of the National Coal Association.

The entire industry mourns his loss and the lack of his able presence will be felt frequently.

George K. Smith, president of the Sunday Creek Coal Co., died on February 18 at Columbus, Ohio. Mr. Smith has long been identified with the bituminous-coal industry, and his many friends will mourn his passing.

James W. Starks, 67, who had been newly appointed director of the State Department of Mines and Minerals, on January 17, died suddenly on February 3.

Mr. Starks was the past president of the Illinois Mining Institute, and for 27 years prior to his appointment

to state office, he was associated with the Peabody Coal Co. For the last ten years he had been superintendent of the company's Springfield-Taylorville division.

Joseph M. Taylor, 70, who had been in the employ of the Southern Coal Co., in its Chicago office for 25 years, died on Saturday, January 29.

A. E. Drucker, 71, dean emeritus of the school of mines and geology of Washington State College at Pullman, Wash., died recently at San Diego, Calif.

John Morgan, long active in the development of the mining industry in Washington State, died in January in Seattle.

Frank Kern, a pioneer of the early days and the trek to Alaska, died recently at his home on Mercer Island, near Seattle.

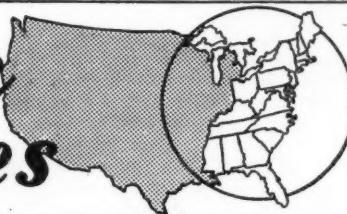
Peyton Guthrie of Blanche, Ky., general manager of the Big Jim Coal Co., died on February 12.

Charles Enzian, mining engineer of Hazleton, Pa., died recently while attending a conference. Mr. Enzian had been district mining engineer at Wilkes-Barre, Pa., for the U. S. Bureau of Mines. Afterwards he was made consulting engineer for the Consolidation Coal Co. He was well known as an expert in rock tunnel work and highly respected for his professional ability and personal attributes.

NEWS and VIEWS



Eastern States



Zinc Institute Annual Meeting

The 31st annual meeting of the American Zinc Institute will be held at the Hotel Statler, St. Louis, on Monday and Tuesday, April 11 and 12. The tax outlook, legislation pertaining to labor relations, mining and smelting costs, and the impact of increased transportation charges will be discussed. Washington officials have been invited to contribute their views with respect to both domestic and foreign mining. The annual dinner and smoker will take place on Monday evening, April 11.

Long Conveyor Project

A new corporation, the Riverlake Belt Conveyor Lines, Inc., was recently formed to build a \$210,000,000 overland belt conveyor system between Lake Erie and the Ohio river. H. B. Stewart, Jr., president of the Akron, Canton and Youngstown Railroad, made the announcement and stated that the system would save \$20,000,000 to \$45,000,000 annually in freight rates on iron ore, limestone, and coal consumed by steel mills and other industries in eastern Ohio and on the upper Ohio river valley, including Pittsburgh.

The main line of the conveyor system, designed to handle bulk cargoes only, will be a two-way belt extending for 103 miles from Lorain on Lake Erie to a terminal on the Ohio river near East Liverpool. Spur lines would serve Youngstown and Cleveland. An

estimated three years will be required to construct the line.

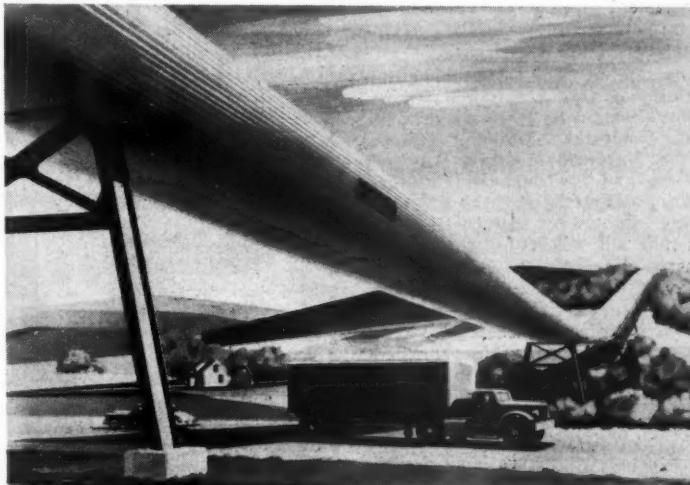
The belt, more than an inch thick, would run on idlers in a sheet steel housing, the floor of which would be about 18 ft wide. This would provide an all weather cover for the belt. A unique pulley system at the end of each conveyor flight would permit utilization of the same belt for moving coal in one direction and iron ore in the other at the same time.

Since announcement of the new idea, differing views have been presented on the project. Marine men see a chance for lengthy delays to

shipping in case of fog at the lake terminal. Steamship men visualize a loss of time in that only a portion of a shipload would go on the conveyor immediately with the balance being directed to stockpiles for later loading. At the Ohio river end of the belt, delays are visualized when the ore would be placed in stockpiles if an insufficient number of barges were on hand to handle it.

Tungsten Mine Sinks Central Shaft

Sinking of the Central shaft of the Tungsten Mining Corp., at Henderson, N. C., was resumed during the latter part of 1948. The original work consisted of sinking and concreting the shaft to a point 40 ft below the collar. As of January 31, 1949 the shaft was 160 ft deep. Sets of 8 by 8-in. timber are being used to support the ground. The new shaft will have three compartments each 4½ by 5-ft. Current plans call for sinking to the 560 ft depth with shaft level stations and ore pockets placed at the 300 and 500-ft levels. A 40-hp electric hoist



Artist's concept of proposed River Lake conveyor line

and a temporary 35-ft wooden headframe are being used for sinking.

When completed the shaft will be equipped with a 70-ft steel headframe and serviced with a 200-hp, motor-driven hoist. A steel frame building will house the hoist and air compressors. Current plans call for placing the shaft in operation by September 1949.

Large Shovel Serves Strip Mine

One of the largest electric power shovels ever used in bituminous coal operations in Pennsylvania has been placed in service to strip coal at the Kent No. 3 mine of the Rochester and Pittsburgh Coal Co. near Indiana, Pa. Construction of the huge shovel required three months. The dipper capacity is 15 cu yd.

AIME Annual Meeting

Some 1700 members of the AIME, with headquarters in New York City, were welcomed to San Francisco by Governor Earl Warren of California to hold their 5-day 1949 Annual meeting. Papers were presented covering activities in all the AIME divisions. Of special significance to mining men were the comments of noted authorities on the steps that might be taken to strengthen the domestic mining industry. Otto Herres, vice-president of Combined Metals Reduction Co., designated tax reform, some tariff protection, and incentives for exploration and development as steps in the right direction. He added that stockpiling of critical and strategic metals, under a policy similar to that establishing a ten year guarantee price for high grade uranium ores with special assistance to districts with low grade ore, and the centralization of government responsibility for mining in the Interior Department would aid greatly in strengthening the domestic mining industry.

In a talk on "The Government Role In Carrying Out A National Mineral Policy," Donald H. McLaughlin, president, Homestake Mining, chairman of the National Minerals Advisory Council, and chairman of the Gold Producers Committee of the American Mining Congress, stated that the principle aid asked by the mining industry from the government was to "avoid excessive taxes." Mr. McLaughlin further suggested that the government should direct support of intensive exploration and development up to the pilot-mill stage in the field of minerals in short supply, and then that the government should step out in favor of private industry.

P. R. Bradley, Jr., president, Pacific Mining Co., deplored the lack of adequate ore search to discover new ore bodies. He marked "mere subsidies"

as "political abhorrent and economically unsound."

Alan M. Bateman, chairman of the department of geology, Yale University, commented that the United States will have to turn more and more to foreign sources for its minerals. Discussing "America's Stake in the Mineral Resources of the World," he declared that "a mineral policy may well determine our foreign policy" in doing business with countries whose economy is based upon mining.

Atomic energy and associated mineral and mining problems came in for their share of attention at this important west coast meeting. John K. Gustafson stated that American private industry can and should carry out the same functions with respect to uranium that it performed with respect to other minerals.

Technical sessions brought out the energetic program being followed by the mining industry to improve upon existing equipment and the application of refined practices in order to achieve the more economic production of minerals. Elton A. Youngberg, mining engineer, Howe Sound Co., described the methods in use at the Holden mine where percussion drills are being utilized for deep hole drilling at approximately 40 percent of the cost for diamond drilling holes the same depth.

Looking into the future, J. H. Hearding, general superintendent, Oliver Iron Mining Co., predicted larger shovels and envisioned trucks powered by 500 hp engines for open-pit use. A unique installation was described by C. A. R. Lambly, general superintendent, Pend Oreille Mines & Metals Co., in a new incline in the Metaline district. Rubber-tired carts will be hauled by an electric tractor to service a new 17 deg inclined shaft. The ore will move on a belt conveyor.

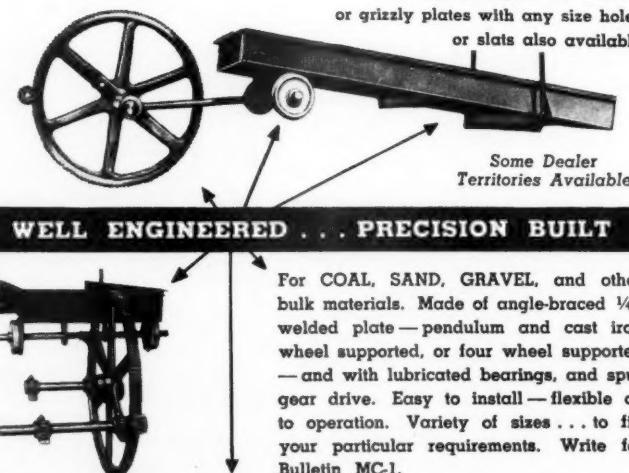
Sessions on milling and beneficiation brought forth considerable controversy on the subject of grinding and flotation. Keen interest was shown in a special session held on titanium.

Edward H. Robie was named new secretary of the AIME. This is good news to mining men everywhere as Mr. Robie has long had their respect and friendship.

Mine Produces Coking Coal

At Rachel, W. Va., the Joanne Coal Co. is now producing 1600 tons of coking coal a day for the Youngstown plant of the Sharon Steel Corp. According to a recent report the production goal for the mine is 500,000 tons per year. The mine was purchased in 1948 from the Jamison Coal & Coke Co.

Reciprocating Feeder...



AMERICAN CONVEYOR COMPANY
CONVEYORS OF ALL TYPES . . . FOR MINES, CONSTRUCTION & INDUSTRY

1115 W. ADAMS STREET • CHICAGO 7, ILLINOIS

Titanium Production Planned

The Quebec Iron and Titanium Corp., owned one-third by the New Jersey Zinc Co. and two-thirds by the Kennecott Copper Corp., estimates that a capital expenditure in the order of \$25,000,000 will be required to develop the titaniferous iron ore deposits in the Allard Lake region of Quebec, Canada. The deposits are located 27 miles north of the St. Lawrence river and about 430 miles northeast of Quebec City in an area heretofore practically inaccessible except by air. Diamond drilling and other exploration have indicated the existence of more than 100,000,000 tons of ore.

Contracts have been let for the construction of a railroad from the mine to Havre St. Pierre on the St. Lawrence river. From Havre St. Pierre the ore will be transported by water to Sorel, Quebec, on the south side of the St. Lawrence river about 50 miles east of Montreal. There a site for an electric furnace smelting plant has been acquired and contracts for engineering and construction have been let. Clearing of the site will begin about April 1, 1949, and it is expected that the first furnace will go into operation late in 1950 with commercial production to be reached in 1952.

Present plans call for mine production at the rate of 1500 tons of ore per day. This amount of ore will yield about 175,000 tons of high grade iron and 240,000 tons of titanium-bearing slag per year.

Bureau of Mines Fights Fires

In a recent announcement the U. S. Bureau of Mines disclosed that attempts will be made to put out two underground coal fires which are a serious "threat to life and property" in Mt. Carmel and Latrobe, Pa. The Bureau is also receiving bids for excavating and filling operations to control a fire near Rifle, Colo.

L. E. YOUNG

Consulting Engineer

Mine Mechanization

Mine Management

Oliver Building Pittsburgh, Pa.

J. W. WOOMER & ASSOCIATES

Consulting Mining Engineers

Modern Mining Systems and Designs
Foreign and Domestic Mining Reports

NATIONAL BANK BLDG.

WHEELING, W. VA.



IN EFFECT, many storage battery locomotives and shuttle cars run on "free power." This applies whenever a company can reduce its line power costs by reducing its peak-load demands, and is able to get all battery charging done during low-load intervals.

EDISON Nickel-Iron-Alkaline Storage Batteries are ideally suited to such service. Six or seven hours of charging during the off-peak period is normally all they need, because they can be charged at an average of full normal rate without injury. They require no critical adjustment of charge rates and can often be charged directly from d-c lines.

Their cells are built of rugged steel to withstand rough haulage duty, and contain an electrolyte which actually preserves the steel parts. Their electrochemical principle of operation is free from self-destructive reactions.

EDISON Batteries last and last, and so through the years cost less and less. If you do not already use them, get a current price quotation . . . you will probably find prices *much lower than you think*; annual operating cost *less than you pay now*.

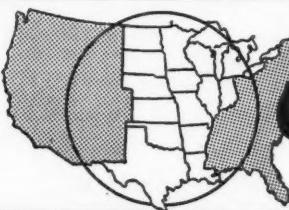
ADVANTAGES OF EDISON NICKEL-IRON-ALKALINE BATTERIES:
They're mechanically durable; electrically foolproof; quickly and easily charged; simple to maintain; not injured by standing idle.



EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES



EDISON STORAGE BATTERY DIVISION
of Thomas A. Edison, Incorporated, West Orange, N. J.
In Canada: International Equipment Co., Ltd., Montreal and Toronto



Central States

North Range to Examine Iron River Mine

The North Range Mining Co. plans an examination of the Iron River mine near Iron River, Mich., and if conditions are found to be satisfactory mining will be started there. The mine, which was worked by the Oliver Iron Mining Co., has been idle and full of water since 1905.

The North Range Co., now producing ore from the Book mine at Alpha and the Blueberry mine at Ishpeming, is preparing to start mining operations next month at the Champion mine at Beacon, Mich. The concern has also acquired a lease on the Warner property at Amasa, Mich., and is preparing to carry on exploratory work there.

Combined Safety Departments

Safety departments of the M. A. Hanna Co. and Butler Brothers were recently combined under the direction of George Borgeson, supervisor of safety for the Hanna firm. For the combined operations, safety activities will be directed from the Hibbing, Minn., office of the Hanna Co.

Coal Mining Engineers

Henry C. Woods, chairman of the board of Sahara Coal Co., Chicago, and chairman of the committee on vocational training and education of the National Coal Association stressed the need for more engineering skills in the bituminous coal industry. In a program to encourage training of workmen and engineers to adequately staff the coal mining industry, the National Coal Association is encouraging young men, preferably miners' sons, to take up coal mining as an engineering career.

M. D. Cooper, director of the industry's vocational training program, has visited some 150 colleges of which only 33 award degrees in mining engineering. Of these only about seven offer degrees in the coal mining industry. Although many coal companies provide scholarships, experience shows that it takes more than scholarships to attract ambitious young men. Further commenting on this subject Mr. Woods spoke of the Illinois Min-

ing Advisory Committee which is to advise the State University about the courses in modern mining which should be taught and of the research projects which are desirable.

Improved Method for Refining Slag

During the past few months the Calumet & Hecla Consolidated Copper Corp., Mich., has been experimenting with melting down refinery slag. A process has been developed for melting the slag to obtain copper suitable for phosphor-copper billets.

An improved method of the soda-ash process for arsenic removal, and the inception of the arsenic-leaching process, has made it possible to melt the slag and obtain copper free from concentrations of troublesome impurities.

The new method will enable the re-

claiming of more copper per month from slag than has been possible previously and will eliminate the high cost of handling, storing, remelting, and recasting low grade ingots.

Fluorspar Source

Illinois is the leading fluorspar producing state. Two counties in the southeastern part of Illinois, Pope and Hardin, furnish 53 percent of the domestic fluorspar production. Another 37 percent comes from the neighboring part of Kentucky. Field studies continue to be made by the Illinois State Geological Survey to aid in the discovery of additional deposits of fluorspar. The geochemical section of the State Survey has a special division engaged in fluorine research which is aimed at the development of further uses for fluorine and fluorine compounds.

Oklahoma Strip Mine Started

In Spiro, Okla., the Spiro Coal & Mining Co. recently opened a strip mine with a capacity of 1500 tons daily. A deep mine on the property is being developed in the Hartshorne seam and production is anticipated in approximately 18 months.

NO SIDE-RACES ON THE "AIR EXPRESS"

WITH

Fulton
FAMOUS FIREPROOF

BRATTICE CLOTH

Give fresh air a fast right of way! No side-tracking in open tunnels with tough, dependable fire-resistant Fulton Brattice Cloth to keep fresh air moving to its destination.

Fulton Brattice Cloth comes in both standard and extra-heavy weights and in widths from 36 to 96 inches. It successfully resists moisture, mildew, fungus, and rot. A sturdy, cloth marker on each easy-to-handle uniform 50-yard roll gives full specifications of the roll.

Ready for immediate shipment through your supply house or from your nearest Fulton branch.

BAG & COTTON MILLS
New Orleans • St. Louis • Denver
New York • Dallas • Minneapolis
Atlanta • Kansas City (Kansas)
Los Angeles



C & H Equips Zinc Mine

Excess machinery of the Calumet division is being utilized in building the mining and milling plant at the Shullsburg, Wis., zinc property of Calumet & Hecla Consolidated Copper Corp. A 200-hp electric hoist, three 2½-ton skips, two 36 by 16-in. crushing rolls and three crushers which will use Ni-Hard jaw faces have been shipped to the new zinc property along with other equipment including head sheaves, water tanks, a Dorr thickener, and skip dumps.

The new zinc mine was discovered in a drilling campaign in southwestern Wisconsin's zinc district. The shaft, at a depth of 350 ft, is the deepest active zinc mining shaft in Wisconsin.

J & L Research Department

In recognition of the broadening scope and importance of research, the Jones & Laughlin Steel Corp. has organized three parallel technical organizations. Ore research will be conducted at Ishpeming, Mich., under the direction of F. X. Tartaron; metallurgical research will be undertaken at the Hazelwood laboratory under the direction of Dr. H. T. Clark;



Surface Plant of the Centennial Mine, Calumet and Hecla Consolidated Copper Corp.

and research on coal and coke will be conducted under the supervision of C. L. Potter.

Galena Area Mapped

New and revised geologic maps for a large part of the zinc and lead mining district in northwestern Illinois have been placed on open file according to a recent announcement made by M. M. Leighton, chief, Illinois State

Geological Survey. They are available for public inspection in the Survey's office, in the National Resources Building on the University of Illinois campus in Urbana, and in the field office in the DeSoto Hotel in Galena.

The area covered by the maps comprises approximately 43 square miles located northeast of Galena. Field and laboratory studies have added to the area and increased the accuracy of the former maps.



Parmanco
MECHANICAL FEED
HORIZONTAL DRILL
WITH TRACTION DRIVE

Ten years of field test has proven that our power-feed design of direct, transmission and worm gearing with two-speed control will not only cut shot hole drilling time in half but also eliminates costly maintenance delays. V-belt drive to the power-feed with an additional ample clutch in that assembly gives absolute control of a drilling speed of two to three feet per minute with a retrieving speed of twenty-four feet per minute.

The Parmanco Horizontal is adapted to all forms of high-wall drilling, will handle a six-inch auger up to a distance of sixty feet or more and, by use of our patented augers with interrupted flights and secondary cutters, will drill an absolutely clean hole with a minimum of torque. It permits the drilling of a controlled-angle hole which makes possible a great saving of explosives through the cantilever effect of this controlled-angle drilled hole.

EFFICIENT STRIPPING STARTS
WITH EFFICIENT DRILLING

PARIS MANUFACTURING COMPANY

PARIS, ILLINOIS

Old Mine Reopened

According to recent reports the Schoper mine near Carlinville, Ill., will be reopened by the Consolidated Coal Co., St. Louis. Development plans will be undertaken as soon as machinery and suitable equipment is available. It is expected that from one to four years will be required to put the shaft back into operating condition. After operating during World War I, the mine was closed down and for the last 15 years has been in the hands of several different owners who have operated the property for a brief period of time.

Mine Inspectors Examination

On March 15, the State Mining Board of the Department of Mines and Minerals of Illinois met at the Abraham Lincoln Hotel, Springfield, Ill., to examine candidates applying for certificates of competency as state mine inspectors.

Car Spraying Prevents Sticking

On the iron ranges of Minnesota, in winter operations, some means of preventing strip material and ore from sticking to the cars during freezing weather must be provided. The use of hot salt brine sprayed in a thin film on the inside of the stripping car was once widely used. Recently calcium chloride in solution has found wide acceptance. Calcium chloride solution has lower freezing values and does not require heat. The mixture is pumped from a tank house where the mixture is prepared and stored and is directed to a set of sprays that deposits the material on all parts of the inside of a car. An entire train can be run through the spray at a speed of about two to three miles per hour thereby completely spraying a train of six cars in about three minutes.

A variety of oils has also been used for this purpose. Although more costly, the oils do not have the corrosive action of calcium chloride and salt.

For Sale

SIX FOOT HYDROTATOR CLASSIFIER

Complete with one 5 H.P. 60 cycle 3-phase Westinghouse Pump Motor, one 3 H.P., 60 cycle, 3-phase, Westinghouse Elevator Motor. Roberts and Schaefer Co. Hydrotator Classifier No. 142, Sprayer No. N-3128, 500 G.P.M., 900 R.P.M., 12 Ft. Head. Used only one week. Will sell for \$5,000. F.O.B.

W. S. MOORE CO.

Brooklyn Road HIBBING, MINN.

SHEFFIELD
TRADEMARK REG.
MOLY-COP
COPPER-MOLYBDENUM-ALLOY
Grinding Balls

Regular
Carbon
Steel Balls

Special Alloy
Moly-Cop Ball

YOUR BEST BUY

The photos of fractured ball sections, reproduced above, show why Moly-Cop balls are your "best buy".

Note the clean break of fine martensitic structure of the Moly-Cop ball and its uniform high hardness to the core.

This is why Moly-Cop balls retain their shape longer, and grind more ore per pound of balls. Moly-Cop balls cut your grinding costs by wearing longer, grinding more efficiently, and by saving charging and handling time (less balls to handle).

Save money—specify Moly-Cop—your "best buy" in grinding balls.

Carbon and Alloy Steel, Ingots, Blooms,
Billets, Plates, Sheets, Merchant
Bars, Steel Joists, Structural
Shapes, Road Guard,
Reinforcing Bars

Welded Wire Mesh, Wire Products, Wire
Rods, Fence, Spring Wire, Nails,
Rivets, Grinding Media, Forgings,
Track Spikes, Bolt
and Nut Products

SHEFFIELD STEEL CORPORATION
HOUSTON KANSAS CITY TULSA

Export Representatives:

Canada: Ellsworth Wood, 10015-110 St., Edmonton, Alberta

All other Countries: **ARMCO INTERNATIONAL CORPORATION** Middletown, Ohio



Kennecott Mills Back at Work

Mills of the Kennecott Copper Corp. near Salt Lake City began grinding out concentrates on February 10 for the first time in more than three months. Two trainloads of ore from Bingham Canyon reached mills at Magna and Arthur. This was the first shipment after the company's railroad was cleared of snow. Work at the mine was resumed after agreement to a recess in the 105-day old strike.

Gilsonite Plant for Colorado

L. L. Gilbert, general manager of the newly organized U. S. Gilsonite Co., recently announced a \$50,000 processing plant would be erected in western Colorado. The exact location has not been determined, but construction was expected to be under way by summer. Gilsonite is mined in western Colorado and eastern Utah and is used in making such products as paints, plastics, synthetic rubber, and asphalt tile.

Montana Coal Operators Meet

Officers of the Montana Coal Operators Association for 1949 were elected in January at the organization's annual meeting held in Billings, Mont. Members who will direct association activities during 1949 are: S. H. Clarke, president; W. A. Romek, vice-president; D. F. Buckingham, secretary-treasurer; and Mrs. Kay Penman, assistant secretary.

Bunker Hill Starts Sinking

After spending about \$1,000,000 in preliminary preparation work the Bunker Hill & Sullivan Mining & Concentrating Co. has started sinking its main operating inclined shaft from the 2800 to the 4000 level, which will be at a depth of 1200 ft below sea level and will make Bunker Hill the deepest mine in the Coeur d'Alene district of Idaho. The added depth will provide 1200 ft. of virgin stoping ground on the mine extensive vein structure. Bunker Hill has been the largest producer in the Coeur d'Alene district for more than 60 years and has only been mined to a depth of 2800 ft. In the new sinking program the mine has been equipped with the largest under-

ground hoist in the world and is otherwise equipped with the latest and most efficient shaft sinking machinery.

Milling facilities have been increased to 1800 tons per day and plans call for 3000 tons per day to take care of production from low grade ores from the old workings near the surface where a block caving system is about ready for production. Under the management of Charles E. Schwab the first 300,000-ton unit to be caved has been blocked out by approximately 7000 ft of development. This work is said to have resulted in the discovery of a blind vein of high grade ore which is being mined separately. Over 5,000,000 tons of low grade ore are estimated as available for caving.

Temporary Shutdown at Tennessee Schuylkill

Operators of the Tennessee mine of the Tennessee Schuylkill Corp., Chloride, Ariz., have temporarily discontinued production in order to carry out a development campaign. Production of lead-zinc concentrates will be resumed within a short time. Engineering estimates show that a possible 300,000 to 400,000 tons of ore will result from the present development plans.

Mining Association Holds Legislative Meeting

The Mining Association of Montana in conjunction with the newly formed Montana Section of the National Safety Council and the Last Chance Gulch Mining Association of Helena held its eighth biennial legislative meeting at the Placer Hotel in Helena, Mont., on January 13.

The Association went on record as favoring a vigorous campaign for the rehabilitation of Montana chrome mines, developed at a cost of \$20,000,000 at the outset of World War II, and then abandoned when the Axis armies were driven back in Europe. Dr. Francis A. Thomson, president of the Montana School of Mines, termed the scrapping of costly equipment at these properties by the WAA a "crime and a colossal blunder." Pointing out that Montana has the greatest domestic chrome ore supply, Dr. Thom-

son said, that this ore can be concentrated up to 42 percent. U. S. steel mills prefer 48 percent concentrates, but demonstrated during the war that they can use those of slightly lower grade. Other speakers reported that U. S. Bureau of Mines representatives had been investigating the possibility of renewed utilization of the Benbow chrome ores, but almost all of the buildings and equipment have been removed from the area.

The association elected Gailen T. Vandel president for the next two years, succeeding A. V. Taylor, Jr. Mr. Vandel, president and general manager of the Jardine Mining Co., said "the association will continue its long established policy of assisting the small operators in conducting a profitable operation by attempting to eliminate or modify those adverse economic factors which add to their costs." Other officers elected were: O. Perry Chisholm, first vice-president; R. B. Caswell, second vice-president; and Carl J. Trauerman, secretary-treasurer. Francis A. Thomson, president of the Montana School of Mines and director of the Montana Bureau of Mines and Geology, was re-elected chairman of the executive committee. At the all-Montana banquet for state legislators Governor John W. Bonner was the speaker.

Save Labor In STRIP MINING— OPEN PIT WORK— STOCKPILING



Above is a Sauerman Scraper handling blasted ore to crusher

You can move any loose materials—coal, ore, sand, gravel, clay—fast and efficiently with a Sauerman Power Scraper. One man handles the entire operation through simple automatic controls. Operating range is easily extended. Sturdily built for long, low-cost service. Electric, gasoline, or Diesel.

Write for Catalog

SAUERMAN BROS., Inc.

540 S. Clinton St. CHICAGO 7

Comments on Gold

To the Editor: In the last mail, I received a letter inviting me to contribute to the support of the Economists' National Committee on Monetary Policy, which is an organization that provides professor Walter E. Spahr of New York University with a means of expounding his rather extreme views with regard to gold and currency. As this appeal for funds was sent to me, I assume that it went to many other mining men, and particularly to those interested in gold. Consequently, a word of warning seems very much in order.

At first glance, Professor Spahr's stand for restoration of the gold standard might appear to deserve favorable response from such a group, but as a matter of fact his vehement opposition to a free market for gold practically places him in the same camp with the extremists who advocate a managed currency with little or no relation to gold. Indeed, Spahr's efforts, even through ostensibly in support of restoration of the gold standard, actually do more harm by confusing thought about gold than do the more radical arguments of the paper money theorists.

Consequently, I trust that my associates in the mining profession will think twice before giving any support to the Economists' National Committee on Monetary Policy of which Professor Spahr is executive vice-president and the principal spokesman.

The interchangeability of the paper dollar and gold at a fixed rate is clearly an end that is most desirable; but it must be reestablished at a level that is determined by the relative position of the paper dollar and of gold in the world today. This is very different from what it was when the gold standard prevailed with gold and the paper dollar interchangeable in a free market at \$20.67 per ounce. Since then, the paper dollar has suffered severely from the extravagances of the New Deal, from the wastage of the war, and from the drastic disturbances created by the huge current expenditures of the government. As everyone knows, these tremendous demands on the wealth of the country were met through deficit financing of one sort or another. If the value of the dollar in gold was correct at \$20.67 per ounce prior to 1934, or at \$35 per ounce shortly after the ownership of gold and free interchangeability were prohibited, it surely has a different value in gold today. If the paper dollar could survive the drastic events of the past 15 years without deprecia-

tion, one might well question the importance of gold as a monetary base. From the degree of domestic inflation and from the chaotic conditions in international trade, however, it is quite apparent that the paper dollar has not escaped the inevitable effects of the excessive dilution to which the currency in one way or another has been subjected.

Gold, on the other hand, has preserved its traditional stability through these troublesome years. It is true that the output of gold for a time was stimulated but the percentage increase in the total world's stocks was nominal. It is also true that the extreme lack of balance between exports and imports of the United States and other disturbances arising from national policies as well as from war resulted in an excessive concentration of the available supply of gold in this country. But, even so, the purchasing power of gold has not depreciated with that of the dollar. If free to function in its proper way, I am sure this would be promptly demonstrated.

To restore the dollar to its former value in terms of gold would require economies and changes that could not possibly be made. Does anyone seriously think that the current debt will be met in dollars with purchasing power and gold value comparable to the old dollar, or that wages and costs of all sort are going to decline to the level that prevailed in 1934? Yet that is essentially what would be required if paper dollars were to be made redeemable in gold at \$35 per ounce without driving the gold out of circulation.

A free market for gold would reveal better than any other device the degree to which the dollar had depreciated. Perhaps it is less than we think. If so, we should know in unmistakable terms. Whatever it is, the value of the current paper dollar should be determined in terms of gold, and interchangeability established at that ratio, with acceptance of the strict discipline and control over the currency and credit that this implies. Stabilization even in this way would not be easy and would have to be accompanied by elimination of wasteful expenditures and extravagances in our national and international policies; but it would be practical to try and should make the other necessary steps toward economic health much easier to take.

A free market for gold is an essential element of the gold standard, and its restoration would be a practical first move toward reestablishing an honest currency with dollars and gold

interchangeable. To attempt to accomplish this abruptly, however, by insisting that the paper dollar in some miraculous way had preserved its virtue through these years of its divorce from gold would be most unrealistic. And to argue that the dollar after the abuse it had suffered was still worthy of being redeemed in gold at no higher price than \$35 per ounce would in effect be a denial of the very characteristics of gold on which its monetary value depends.

Signed: DONALD H. MC LAUGHLIN,
President, Homestake Mining Co.

NOTE: MINING CONGRESS JOURNAL
welcomes its readers' comments on topics of timely interest to the industry.

Engineers' Day

All branches of engineering will be represented at the 15th Annual Engineers' Day of the Colorado School of Mines in Golden, Colo., April 22 and 23, 1949. The event will feature technical sessions in mining, metallurgy, petroleum production, petroleum refining, geophysics, and geology, as well as exhibits from companies engaged in the mineral industries.

Alfred M. Staehle, vice-president, McGraw-Hill Publishing Co., will be the speaker of the day. His talk will be preceded by a rock-drilling and mucking contest between teams of students. Exhibits of industrial machinery and other items of engineering importance will be available for inspection throughout the two-day meeting.

On Friday afternoon widely known authorities of the petroleum industry and prominent metallurgists will speak. On Saturday, a tour of the U. S. Bureau of Mines Experiment Station at Golden, additional technical sessions, and continuing inspection of the exhibits will be featured.

Athletic Expands Operations

The Athletic Mining Co. of Klondyke, Ariz., is making plans to expand its operations and when additional crews can be obtained will put the Grand Center, the No. 1, and the Arizona Mines on a productive basis. In addition, a diamond drill crew is drilling near the No. 1 mine, this being the fourth property in the Aravipa district to be drilled by the Athletic company. At present production is coming from the Head Center and the Iron Cap mines, and 100 tons of lead-zinc-gold ore are milled daily. The Head Center shaft is being deepened under contract by Miller and Henderson.

PD Sets Scholarship Program

A scholarship program with awards of more than \$14,400 annually has been established by the Phelps Dodge Corp.

At the University of Arizona two freshman scholarships carrying a stipend of \$1,000 each are to be awarded annually; and in the first year of the plan's operation two like scholarships will be awarded in the junior, and senior classes. Two scholarships are provided for university graduates, each to carry the grant of \$1,200 and tuition.

The eight undergraduate scholarships and one graduate scholarship will be open to men and women students; and one graduate award is to be made to a man for advanced study in mining, metallurgy, or their allied fields. Other scholarship winners may select their own fields of study. Graduate students will not be required to do their advanced study at the University of Arizona, but may take that work at any approved institution.

One of the undergraduate scholarships for each of the academic years will be made to a student from the Phelps Dodge mining districts of the states, and the remainder from the state at large.

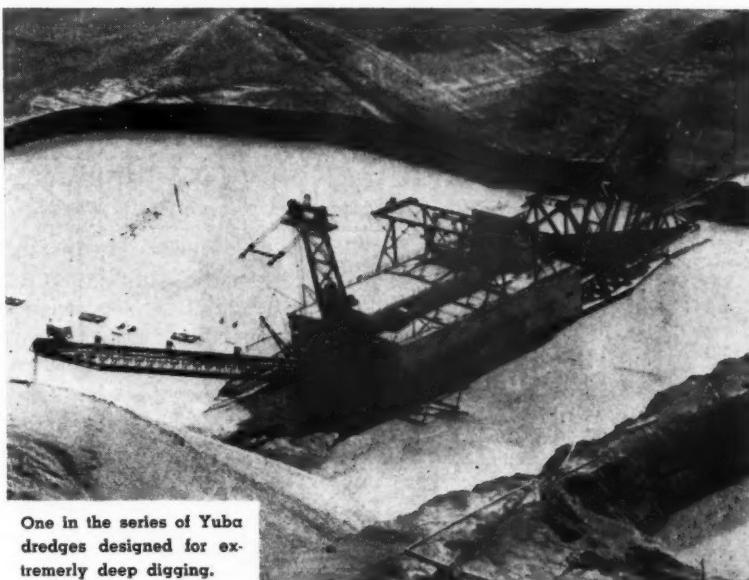
For Arizona State College at Tempe, the scholarships will total \$4,000 annually. The plan will be inaugurated this year by selecting one student in each class, with scholarship awards amounting to \$1,000 annually until each graduates. After that, a first-year student will be selected, this student to receive the award during each of his four undergraduate years at the school.

Wheels of Government

(Continued from page 59)

derly world market in gold, and states: "Thus, a free market for gold, in addition to being a horse-sense first step to the return of an honest gold standard, carries definite advantages in the form of a common denominator for world currencies, as an aid to the Treasury in the management of the public debt, as an inflation deterrent, and as a stimulant to foreign economies not underwritten by Uncle Sam. It will correct a gross injustice to the gold producer. It will restore to the American an essential right, a right that should never have been taken from him. Free markets are anathema to dictators and planners. In a free market the individual records his choice. . . . It is an independence which neither the dictator nor the planner can tolerate. It imposes a limit on the power of the dictator and cramps the designs of the planner."

NOW YOU CAN HAVE YUBA DREDGES WITH BUCKETS 27 CU. FT. AND LARGER



One in the series of Yuba dredges designed for extremely deep digging.

YUBA Leads in Deep-digging, Big-capacity Dredge Design; Can Make Good Delivery

Today many properties require deep-digging dredges and capacity to handle big yardages. To meet these requirements, Yuba now is prepared to furnish bucket ladder dredges with capacities of 27 cu. ft. or larger, and digging depths from 95 feet or less, to 150 feet. We design and build dredges with all bucket capacities from the smallest to the largest.

DESIGNED TO YOUR NEEDS

Each dredge that Yuba builds is individually designed to meet the exact needs of the work to be done; the first consideration is your operating conditions. Whether your dredge work requires ability to handle deep-ground, hard bedrock, clay, boulders, levee building, stream control, or any other problem—we can help you.

YUBA COOPERATES WITH YOU

For 40 years Yuba has pioneered and led the field in designing and building dredges which are in use today all over the world. This world-wide experience is available to you. Your operating skill and knowledge of your property, plus Yuba's engineering and operating experience, form the winning combination that will produce the successful dredge for your special requirements.

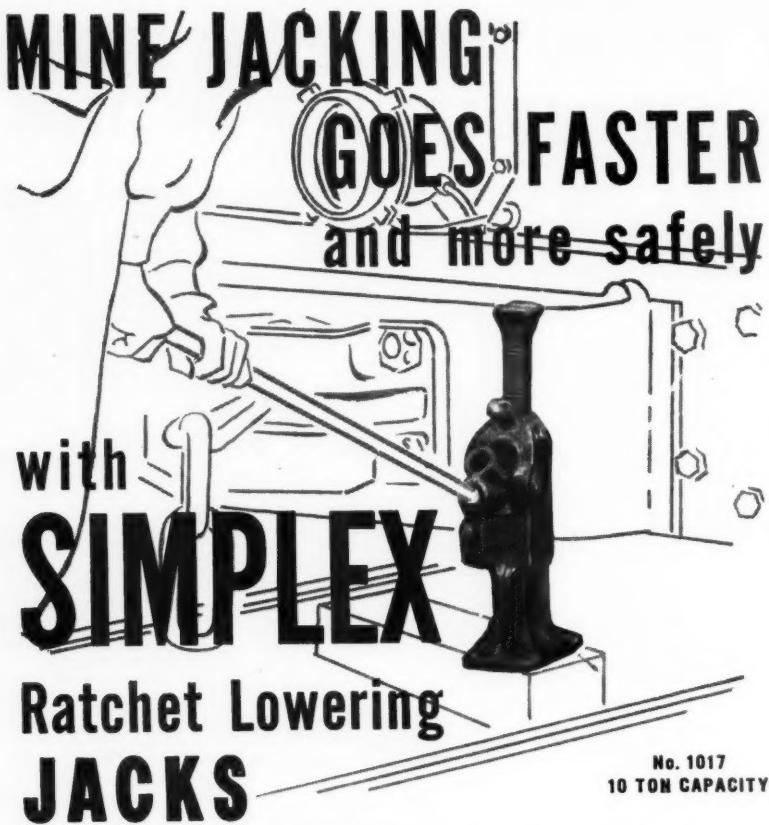
Consult Yuba NOW. No obligation. Wire or write us today.

YUBA MANUFACTURING CO.

Room 707, 351 California St., San Francisco 4, California, U.S.A.
AGENTS: SIME, DARBY & CO., LTD. • SINGAPORE, KUALA LUMPUR, PENANG.
SHAW DARBY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E.C. 3.
CABLES: YUBAMAN, SAN FRANCISCO • SHAWDARBCO, LONDON



If you need special equipment built to your order, Yuba has complete steel fabricating and machine shop facilities. Send us your blueprints or specifications for prices.



No. 1017
10 TON CAPACITY

Single Acting Jacks That Lift Full Capacity on Cap or Toe!

Use these single acting jacks for safe, sure operation in mine jacking — for lifting, lowering, pushing or pulling. Double lever sockets speed work in cramped quarters and in angular lifting. All models will lift full capacity on the toe or on the cap—a feature that only Simplex Ratchet Lowering Jacks give you.

Best materials are used throughout for long-life operation under all conditions. When you specify Simplex you get jacks made by the manufacturer awarded the only gold medal for the safety of jacks by the American Museum of Safety.

Ratchet lowering jacks are available in 14 models with capacities ranging from 5 to 35 tons and lifts from 7 to 18 inches. All have two-way standard lever socket except the largest models. Delivered with lever included.

For full information on all types of Simplex mine jacking equipment write for Bulletin Mines 47.

SIMPLEX HYDRAULIC JACKS



For hydraulic ease of operation plus complete safety on heavy duty jacking in mines. Available in eight models to handle from 3 to 100 tons — tested to 50% overload. Send for Bulletin HJ 47.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks

TEMPLETON, KENLY & COMPANY
1042 South Central Avenue, Chicago 44, Illinois

New Mexico Miners Meet

New officers of the New Mexico Miners and Prospectors Association were elected at the annual meeting held February 13 at Santa Fe, N. M. They are: George A. Warner, president; Joseph H. Taylor, first vice-president; Dr. Vincent C. Kelley, second vice-president, and J. C. Pierce, secretary-treasurer.

Guest speaker at the annual banquet was Dr. James Boyd, Director of the U. S. Bureau of Mines. His subject was "The Bureau of Mines Place in Minerals Research."

The association adopted a declaration of policy calling for the alleviation of the low-level "colonial" economy now being suffered by New Mexico and its people; full economic development of the State; to encourage the development of the State's underground resources; and maintenance of a healthy, vigorous dignified, and prosperous mining industry.

Opposition was expressed to any increase in the State sales tax and severance taxes because such tax burden would prevent operation of many marginal and small mines and work a hardship on all mining operations in New Mexico.

The Association went on record concerning employer-employee relationships, declaring "that any new legislation by Congress retain the major provisions of the Labor-Management Act of 1947."

New Ore in Summit Mine

Ralph R. Langley, president of Arizona Metals Co. at Kingman, Ariz., reports that a new ore shoot of high-grade ore has been opened above the 300-ft level in its Summit mine. The new shoot lies parallel to and is believed to be of about the same dimensions and volume as the one from which 20,000 tons of ore were mined during the last three years. The ore, which contains gold, silver, copper, lead, and zinc, with lead values prevailing, is milled at the Keystone mill in Mineral Park, operated by Mohave Lead and Zinc Co.

Midland Terminal Junked

In February 1949 dismantling operations began on the Midland Terminal Railway which has been moving gold ore from Cripple Creek to Colorado Springs, Colo., since 1892, over various components of the 60-mile line. Over 86 percent of its revenue in recent years has come from carrying ores to the mill of the Golden Cycle Corp. owner of the Midland Terminal Railway since 1934.

Abandonment of the railroad is part of the program which entails moving the Golden Cycle mill to Cripple Creek. Construction of the new mill at Cripple Creek will require

about a year but plans are progressing rapidly under the direction of O. W. Walvoord, designing engineer. The new mill will have a capacity of 1000 tons per day. It will be constructed in units so that small tonnage can be economically and efficiently milled. Space will be provided for increasing the capacity to 1500 tons per day if conditions warrant.

During construction of the mill, mining operations carried on in the Cripple Creek district by the Golden Cycle Corp. and other allied mining companies will be suspended. Laterals from the Carlton tunnel to the Cresson and Vindicator mines will be continued and the period will be utilized to rehabilitate surface plant and equipment. A new hoist with a capacity of 5000 ft will be installed at the Cresson mine during this period.

Operations are continuing at the Golden Cycle mill in Colorado Springs in order to clean up values tied up in the mill and underlying ground.

Alaskan Miners Meet

On February 18, members of the Alaska Miners' Association held a stag dinner party at the Arctic Club in Seattle. Three leading equipment dealers serving the territory, Northern Commercial Co., Yukon Equipment, Inc., and Glenn Carrington & Co., were hosts to the northern mining men.

Charles J. Johnston, Goodnews Bay Mining Co., served as master of ceremonies, pinch hitting for James K. Crowd, president, Alaska Miners' Association.

Combined Metals to Enlarge Mill

Combined Metals Reduction Co. plans to enlarge its selective flotation mill at Pioche, Nev., to increase the plant's capacity to 1200 tons per day, it was recently announced by S. S. Arentz. About 100 more miners will be added. The company is also developing another lead-zinc-silver mine at Comet, Nev., and shipping concentrates by rail to its smelter at Bauer, Utah. Perlite is also being mined from two nearby properties and processed at Bauer.

U. S. Grant Continues Work

U. S. Grant Mining Co., Virginia City, Mont., has continued development work on ore showings cut when driving the 4500-ft drainage tunnel recently completed. With water finally drained off and ventilation established, drifting to the east was commenced on the main vein. This drift has reached the No. 2 ore shoot, which has been reported to be 4 ft wide and to assay \$30-\$46 a ton. This level, reaching a depth of 1000 ft below the surface, provides extensive stoping ground above.

"VIC" TELLS HOW

**YOU CAN LAY PIPE FASTER
AND CUT LABOR COSTS, TOO
WITH VICTAULIC COUPLINGS!**

LESS TIME PER JOB!...

just tighten the two bolts on Victaulic Couplings and you button up a piping system that's leak-tight and slip-proof... one that's flexible... and one that automatically allows for contraction or expansion at each and every coupling.

LOWER LABOR COSTS!... no specially trained or skilled labor is needed when you connect your piping system with quick-and-easy Victaulic Couplings... and the only tool required is a standard T-wrench!

★ TO INCREASE the output of your pipeline... and lower pumping costs at the same time... use Full-Flow Victaulic Elbows, Tees, and other Fittings!

★ TO GROOVE pipe ends twice as fast... with half the effort of ordinary pipe threaders... use our new "Vic Groover"!

WRITE TODAY for these two catalogs and see how you can save time, material, money: Victaulic Catalog and Engineering Manual No. 44... "Vic Groover" Catalog No. VG-47.

FOR FULL ECONOMY... MAKE YOUR PIPING SYSTEM ALL VICTAULIC!

SELF ALIGNING PIPE COUPLINGS

VICTAULIC
EFFICIENT FULL-FLOW FITTINGS

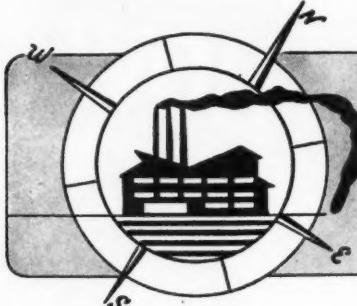


**VICTAULIC COMPANY
OF AMERICA**

30 ROCKEFELLER PLAZA, N. Y. 20, N. Y.
Victaulic Inc., 727 W. 7th St., Los Angeles 14, Cal.
Victaulic Co. of Can. Ltd., 200 Bay St., Toronto 1

For Export outside U. S. and Canada: PIPECO
Couplings and Fittings - Pipe Couplings, Inc.,
30 Rockefeller Plaza, New York 20, N. Y.

Copyright 1949, by Victaulic Co. of America



Manufacturers Forum

Augerless Drill Bit

Kennametal Inc., Latrobe, Pa., has announced a new augerless hitch drill bit which has three prongs with built-in solids of cemented carbide as cutting edges.



The short bit shank has a twist design to fit Kennametal chucks. A pilot attachment is an integral part of the drill bit designed to prevent cores, give accurate hole location, and keep the hole straight. One application for the new bit is for drilling horizontal holes at the top of the rib when installing cross-timbers for roof support. The bit is for use on standard post drills and it is available in sizes from $3\frac{1}{8}$ to $7\frac{1}{2}$ in.

Safety Headwear

"Turtle Back" safety helmets and caps produced by the Industrial Products Co., Philadelphia, have been tested and approved by the coal mine section of the Pennsylvania Compensating Rating and Inspection Bureau. The helmet has a nylon lace to give long life and offer resistance to acid fumes. Winter linings made of woven woolen material are available which may be worn separately under the helmet or cap to provide warmth and comfort in cold weather. Both caps and helmets are available in sizes ranging from $6\frac{1}{2}$ to 8 or in a universal size which has adjustable sweat bands to fit these head sizes.

Crane Carriage

A new department, to enlarge its scope of activity in the industrial and construction machinery field, has been formed by the Keystone Driller Co., manufacturers of blast hole, well drilling, and heavy excavating machinery. The new department, known as the Equipment Division, will be located in downtown Pittsburgh, Pa., at 419 Wood Street.

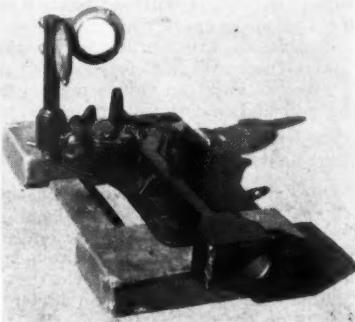
The first offering of the new department will be a 15 to 25-ton capacity, self-propelled, one man crane carriage or wagon on pneumatic tires for all makes of cranes.

Robert H. Fox and associates, Van Nuys, Calif., will direct the engineering and marketing of this line of industrial equipment.

Reflecting Switch Stand

Equipped with red and green reflectors, the Bethlehem Steel Co.'s Model 1217 parallel-throw switch stand, gives a true indication of the point setting and positions it to permit the motor man to control his trip. The 3-in. stimsonite reflectors are said to stand out distinctly in the dark. Reflector targets may be installed without need of any extra

connecting rods nor any extra holes required in the switch rod. The target



blade, with reflectors fastened to a spindle, turns through an arc of 90 deg when the switch is thrown.

All Electric Shovel

Recently the Marion Power Shovel Co., Marion, Ohio, announced the addition of the type 111-M Ward-Leonard all-electric machine to its line of excavating equipment. The new shovel is designed for heavy-duty

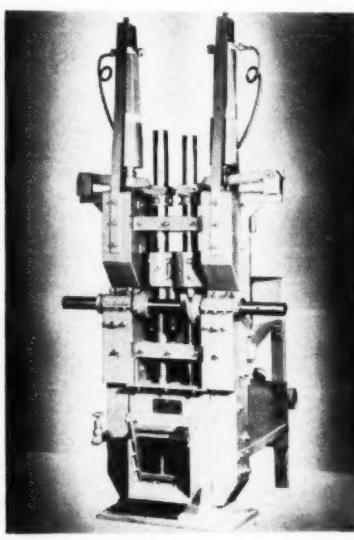
service and may be equipped either with a $3\frac{1}{2}$ -cu yd dipper and 33-ft boom or with a 6-cu yd dipper for coal loading service. All motions are electrically controlled.



An action view of the new all-electric machine

"Air Booster" Stamp Mills

A new development in stamp mills recently introduced by the Gruss-Hercules Mining Machinery Co. of San Francisco is said to have a production rate 4 to 5 times greater than the old conventional type of stamp mill. The new mill is useful for duty in inaccessible locations as a light

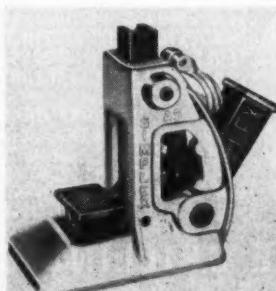


weight truck can handle a heavy duty model and the heaviest part of the prospector model weighs only 275 lb.

The heavy duty model with a capacity of 15 tons per 24 hour day is reported to use 15 hp for operation by any type of gasoline, diesel, or electric power. The striking power of the stamp may be changed by adjusting the pressure of the "Air Booster." No air compressor is required.

Railroad Track Jack

Designed especially for railroad work, a new Simplex aluminum alloy track jack is said to be a convenient universal unit for tamping, surfacing, and lining. The new A5 jack weighs 26 lb. The aluminum jack has an enlarged toe lift of 2½ by 3¼ in.



to enable lifting at the end of ties without cutting into the bottom of ties. With a capacity of 15 tons, the jack has a minimum height of toe lift of 2½ in. The total lift of the 11-in. high jack is 5 in.

Aluminum Screen

A newly designed aluminum dewatering screen, which will be known as "Kleenlot Aluminum Screen" has been announced by the Wedge Wire Corp. of Cleveland. Test screens have been installed for a year in various mines on vibrator operations and

records on wearability and performance have been satisfactory.

Explosion-Proof Switch

Rotary snap switches produced by the Electro Switch Corp., Weymouth, Mass., are now available in explosion-proof, dust-tight, vapor-tight, weatherproof housings for hazardous locations. Types are available for special installations either surface-mounted types with the switch handle on the dome or may be furnished with the switch shaft inverted and projecting through the base for panel mounting.

— Announcements —

James V. Wilcox and **Jason C. McGuire** have been appointed as sales and service representatives for **Kennametal Inc.**, Latrobe, Pa. Mr. Wilcox will serve the territory of Utah, Wyoming, and western Colorado and Mr. McGuire will serve the central West Virginia territory.

* * *

The Explosives Department of American Cyanamid Co. recently announced that **Wm. T. Dove** succeeded **Thomas Dove** as district manager at Pottsville, Pa., with Thomas Dove continuing in advisory capacity. At Bluefield, W. Va., **T. B. Dunn** succeeded **J. C. Evans** as district manager. Mr. Evans continues in an advisory capacity. At Pittsburgh, Pa., **P. H. Johnson** replaces **J. G. Roberts** in the contractors' section, with Mr. Roberts continuing in an advisory capacity.

* * *

Dale Hagenbook, who has been with the **Goodman Manufacturing Co.** since 1937, has been appointed chief engineer of the company. He succeeds **W. W. Sloane**, who is now serving as vice-president in charge of engineering.

* * *



Luther Strole has been designated manager of industrial relations for the **National Lead Co.** **Fehl J. Shirley**, former manager of that department, has been appointed assistant manager of the titanium division of the company.

* * *

Roy E. Jones, formerly assistant export manager of **Link-Belt Co.**, has been appointed export manager to succeed **Carl A. Woerwag**, who has retired because of ill health.

* * *

R. W. (Pat) Murphey has been appointed advertising manager for **Taylor Forge & Pipe Works**, Chicago.

At the February directors' meeting of the **Ohio Brass Co.** **Louis J. Ott**, who has been with the company since 1928, was appointed general sales



Louis J. Ott



R. A. LeFevre

manager. At the same time, announcement was made of the appointment of **R. A. LeFevre** as advertising manager.

* * *

The **American Car and Foundry Co.** has announced the appointment of **Nelson C. Walker** as district manager of their Berwick, Pa., plant.

* * *

Behr Dolbear & Co. of New York have been appointed General Consultants and Technical Advisors on Minerals to the government of the Union of Burma. The Burma government plans to expand domestic mineral industries.

* * *

In a recent announcement, **R. R. Zisette**, general sales manager of **SKF Industries, Inc.**, named **Stuart H. Smith** as Cincinnati district manager.

* * *

A new Seattle warehouse office has been established by **Raybestos-Manhattan, Inc.**, at 314 Occidental Ave., for the convenience of customers of the Pacific Northwest. **Russel G. Heuman** will be in charge of the new facility.

* * *

According to a recent announcement, **William E. Gahl** has been appointed chief engineer of **Templeton, Kenly & Co.**, Chicago, manufacturers of Simplex jacks. Mr. Gahl succeeds **F. J. Jakoubek**, who has resigned to enter the manufacturing business for himself.

— Index To Advertisers —

	Page		Page
Allis-Chalmers Mfg. Co.	8-9	Joy Mfg. Co.	40-41
American Brake Shoe Co.	60	Link-Belt Co.	6-7
(American Manganese Steel Div.)		Longyear Co., E. J.	19
American Car & Foundry Co.	12	Mines Equipment Co.	23
American Conveyor Co.	64	Mine Safety Appliances Co.	Back Cover
Anaconda Wire & Cable Co.	44	Moore Co., W. S.	68
Baker Mfg. Co.	13	Mott Core Drilling Co.	76
Bethlehem Steel Co.	11	Ohio Brass Co.	16-17
Bucyrus-Erie Co.	18	Paris Mfg. Co.	67
Crane Co.	36	Pennsylvania Drilling Co.	76
Cummins Engine Co.	22	Roebling's Sons Co., John A.	4
Denver Equipment Co.	20	Sanford-Day Iron Works	1
DuPont de Nemours Co., Inc., E. I.	10	Sauerman Bros., Inc.	69
Edison, Inc., Thos. A.	65	Sheffield Steel Corp.	68
Storage Battery Div.		Templeton, Kenly & Co.	72
Fulton Bag & Cotton Mills	66	Timken Roller Bearing Co.	Second Cover
Gardner-Denver Co.	24	Universal Vibrating Screen Co.	76
General Electric Co.	14-15	Victaulic Co. of America	73
Hewitt-Robins, Inc.	Third Cover	Western Machinery Co.	35
(Robins Conveyor Div.)		Woomer & Associates, J. W.	65
Hoffman Bros. Drilling Co.	76	Young, L. E.	65
I-T-E Circuit Breaker Co.	21	Yuba Mfg. Co.	71
Jeffrey Mfg. Co.	2-3		

Established 1902

HOFFMAN BROS DRILLING CO.
CONTRACTORS

DIAMOND CORE DRILLING
PUNXSUTAWNEY, PA.

Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed

CORE DRILLING
ANYWHERE
"We look into the earth"

PENNSYLVANIA DRILLING COMPANY
PITTSBURGH 20, PA.

UNIVERSAL SCREENS and UNIVIBE RIDDLES

Vibrating Screens and Vibratory Riddles, in many sizes and types, all priced most reasonably. . . . Tried, Proved and Guaranteed Products. Leaders in Screening Field Since 1919.

Write for Catalog on Screens and Screening

UNIVERSAL VIBRATING SCREEN CO.
RACINE - WISCONSIN



Two Deck Model
42" x 96"
Motor &
V-rope Dr.

DIAMOND CORE DRILLING
CONTRACTORS

TESTING COAL AND ALL MINERAL PROPERTIES..USING OUR LIGHT GASOLINE DRILLS..THEY SAVE FUEL AND MOVING COSTS..WE GUARANTEE SATISFACTORY AND PROPER CORES..

PRE-PRESSURE GROUTING FOR MINE SHAFTS... GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD. WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED... ELECTRIC DRILLS FOR INSIDE MINE DRILLING..

MOTT CORE DRILLING CO.
HUNTINGTON, W. VA.

age
41
6-7
19
23
over
68
76
5-17
67
76
4
1
69
68
72
over
76
73
35
65
65
71



Hewitt-Robins warehouse at Charleston, W. Va.

A "special delivery" service for mine operators

Hewitt-Robins' plan of warehousing assures you fast delivery!

When you need parts for your mine conveyor *quick*, Hewitt-Robins will "deliver the goods" in a hurry.

The reason lies in those stacks of mine conveyor units you see above. For a complete stock of idlers, sections, pulleys, machinery and other component parts for Hewitt-Robins Mine Conveyors is carried in two convenient warehouses: Charleston, W. Va. and Passaic, N. J.

This is one of many reasons why leading mine operators depend on Hewitt-Robins Mine Conveyors for continuous, on-the-job performance without worry of costly shutdowns.

Of course, excellent performance is to be expected of products made by Hewitt-Robins. It is the only company that can assume full responsibility for all elements of your mine conveyor. Idlers, pulleys, drive units, belting . . . all are engineered and installed by this one organization—*as a single unit!*

Depend on Hewitt-Robins Mine

Conveyors to speed your production . . . lower your operating costs. For full details write today for Bulletin 127A. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

**HEWITT
ROBINS**
**MINE
CONVEYORS**



ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

Unfailing

**EDISON
LIGHT**

aids
teamwork
underground



The smooth operation of each group of workers underground is aided strongly by Edison Electric Cap Lamps. Brilliant, *unfailing* light, powered by the unique Edison nickel-iron-alkaline battery, enables each miner to do his work better—and more safely—at all times. May we arrange a practical demonstration for you?

**EDISON ELECTRIC
CAP LAMPS**

M-S-A



MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS PITTSBURGH 8, PA.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED - Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Chicago, N.S.

MINE SAFETY APPLIANCES CO. (S.A.) LTD. - Johannesburg, South Africa; M'Dale, No. Rhodesia; Bulawayo, So. Rhodesia

Representatives in Principal Cities in Mexico, Central and South America CABLE ADDRESS, "MINSAF" PITTSBURGH

er-
ps.
on
his
ge